THE UNIVERSITY OF CHICAGO

CHILDREN'S THINKING ABOUT SOCIETAL POWER AND STATUS HIERARCHIES

A DISSERTATION SUBMITTED TO

THE FACULTY OF THE DIVISION OF THE SOCIAL SCIENCES

IN CANDIDACY FOR THE DEGREE OF

DOCTOR OF PHILOSOPHY

DEPARTMENT OF PSYCHOLOGY

BY

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CHICAGO, ILLINOIS

JUNE 2023

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ACKNOWLEDGEMENTS

The work presented in this dissertation reflects my academic journey as a PhD student. That journey has been deeply defined by the many people who have supported me and this work; the lasting collaborations and friendships I have built; and the diverse and inspiring communities of which I have been so lucky to be a part. To my PhD advisor, Katie Kinzler: thank you for the endless mentorship, guidance, and encouragement. I am immensely grateful to have worked with someone over these years who is not only such an innovative and thoughtful scholar, but also someone who has gone above and beyond to support me as an individual. As I move forward in my academic career, I know I will think often of the example you have set. Thank you also to my broader community of research mentors—Tamar Kushnir, Alex Shaw, Amanda Woodward, Kristin Shutts, Andrei Cimpian, Shige Oishi, Sarah Gaither, Melissa Ferguson, and Dave Nussbaum. Thank you all for inspiring me; for pushing my thinking in new directions; and for always rooting for me. I would also like to thank the Department of Psychology at the University of Chicago for providing me with an academic home in which to complete and receive feedback on this work, as well as the Departments of Psychology and Human Development at Cornell University for providing me with the opportunity to launch my PhD journey.

A huge thank you to my team of people in the Development of Social Cognition Lab. To Radhika Santhanagopalan: thank you for being my partner in crime throughout graduate school. I cannot imagine this journey without you in it, and you have become family in the process. To Jesús Bas: so much of the thinking presented in this dissertation is the result of our conversations. You have become a dear friend, and I am so glad our paths crossed. To Molly Gibian and Gemma Smith, thank you for your remarkable support at all levels of testing organization and implementation. To Lara Akande, Beza Desta, Sasha Diaz, Jason Hamm,

Lauren Kingsly, Julia Levine, Nicole Mateo, Cécile Ngo, Paola Ocampo, Boluwatife Omotoba, Ashlyn Smith, Hanna Swerdin, Carolyn Todd, and Kayla Young—who helped with the specific work presented here—and to the many other students with whom I have had the pleasure of working: thank you for your diligent help with recruitment and testing, stimuli design, data management, and coding. Thank you especially for your interest in and your dedication to this work. It has been an honor to work with each one of you and to watch you go on to pursue your own paths. To Radhika Santhanagopalan, Rachel King, Kaila Scott-Charles, Jessica Waltmon, Rajen Anderson, Reut Shachnai, Jessie Bregant, Marie-France Champoux-Larsson, Ben Morris, Hannah Hok, Mitchell Landers, Katie Vasquez, and Alex Mackiel: thank you for being the best lab mates; for the insightful feedback; for the travel companionship; and for the many chats about research and beyond. Thank you also to the children, families, schools, museums, camps, and funders without whom this research would not have been possible.

Last, but far from least, an enormous thank you to my incredible family and friends for being part of this journey and for supporting me in ways both big and small. A special thank you to my parents, Alice, Richard, and Nancy, for allowing me to ask "Why?" since my earliest years and for cheering me on since the very start. To my sister, Meah, for inspiring my interest in developmental psychology; for being my first participant as I amateurly tried my hand at research during undergraduate courses; and for being such a dear friend. To my "little family" — my partner, Cody, and our wonderful—though mischievous—cats, Huck and Finn: thank you for walking alongside me during these years; for moving so I could pursue my dreams; for picking me up when I needed it; for loving and supporting me unconditionally; and for making me laugh. I am so grateful that this journey brought me to you.

ABSTRACT

Societal hierarchies within and between groups are prevalent and impactful. Young children's thinking about societal hierarchies offers a valuable lens into how the structure of the social world becomes represented in people's minds and into ways of thinking about and responding to societal structures that may remain intuitive across the lifespan and over time. In this dissertation, I identify some general learning principles through which young children build representations of societal hierarchies. In doing so, I aim to provide conceptual nuance to this research area by disentangling children's thinking about two hierarchy-related constructs: power (i.e., dominance; control over resources and outcomes) and status (i.e., social standing; prestige or value in the eyes of others). In Part I, I underscore patterns of social choices (i.e., whom people choose for positive interactions or roles) as a powerful cue to hierarchies between groups at both the individual level (which groups an agent prefers) and the societal level (which groups are privileged). I further demonstrate that children track social choices to reason about groups' relative social standing but not their relative physical power. In Part II, I show that children readily use numerical group size as a cue to social rank, but do so differently depending on whether the context evokes thinking about power or status. I additionally show that whereas representations of power structures emerge early and remain relatively stable over development, representations of status structures develop more gradually. In Part III, I show that children's relative valuation of power and status as embodied in individual leaders (i.e., the people at the top of status hierarchies) depends on the context in which a leader is chosen. Specifically, I demonstrate that children choose prestigious (i.e., respected, skilled) leaders during times of cooperation and peace but prefer dominant (i.e., powerful, strong) leaders during times of conflict and competition. Mirroring the findings of Part II, I find that preferences for dominant

and prestigious leaders unfold over different developmental timelines: Whereas preferences for dominant leaders emerge early, preferences for prestigious leaders strengthen with age, and this especially appears to be the case among children with more liberal (vs. conservative) parents. In Part IV, I conclude by presenting a theoretical synthesis of recent findings on children's thinking about societal power and status hierarchies and point to outstanding questions for future research.

Introduction

The social world is deeply hierarchical. Across many contexts, power and status are distributed unevenly across individuals and the groups that they comprise. These patterns of social stratification are as impactful as they are prevalent, with consequences for people's well-being, opportunities, and experiences in the world (Fiske et al., 2016; Kraus et al., 2013; Magee & Galinsky, 2008; Sidanius & Pratto, 1999; van Kleef & Lange, 2020; Yu & Blader, 2020). Importantly, societal hierarchies can be found not only in the world, but also in people's minds (Axt et al., 2014; Cheryan & Markus, 2020; N. Kteily et al., 2012; Zitek & Tiedens, 2012). These mental representations guide people's social perceptions, interactions, and attitudes (including stereotypes and prejudice) (Dupree & Torrez, 2021; Fiske et al., 2016; Ho et al., 2013; Hudson et al., 2019; Mandalaywala et al., 2018); and provide a foundation upon which both efforts to uphold and to challenge societal structures can arise (Craig et al., 2020; Magee & Galinsky, 2008; McCall et al., 2017; Sibley & Duckitt, 2010).

In recent years, research on the development of social cognition has begun to reveal that mental representations of social hierarchies begin taking shape within the first years of life. As early as infancy, children can identify social rank asymmetries between individuals and between social groups (Bas & Sebastian-Galles, 2021; Enright et al., 2017; Mascaro & Csibra, 2012; Pun et al., 2016, 2016; Thomsen et al., 2011); and as children grow, they demonstrate an increasing awareness of social hierarchies in the world (Mandalaywala et al., 2020; Santhanagopalan et al., 2022; Shutts, 2015). By the early school years, children use a range of cues, including people's relative resources (Charafeddine et al., 2015; Enright et al., 2020; Shutts et al., 2016), influence over others (Gülgöz & Gelman, 2017; Over & Carpenter, 2015), and social group memberships (e.g., gender, race, nationality, language; Bigler et al., 2008; Charafeddine et al., 2020; Dukler &

Liberman, 2022; Kinzler & Dejesus, 2012; Reyes-Jaquez & Koenig, 2022; Santhanagopalan et al., 2021; Yazdi et al., 2020) to make predictions about people's relative social rank. Together, these findings underscore just how salient societal hierarchies are, and they point to studies with young children as a unique opportunity to bridge the individual and the societal—to understand how patterns of social stratification in the world first become represented in people's minds and to uncover early ways of thinking about and responding to societal structures that may remain intuitive across the lifespan and over time.

In this dissertation, I take evidence that children are aware of societal hierarchies as a starting point to investigate the mechanisms and representational building blocks through which this awareness forms. This research embraces the notion that understanding the inputs through which young children build representations of societal hierarchies can illuminate how negative implications of this learning (bias, stereotypes) are formed and ultimately may be reshaped. In Parts I and II, I identify patterns of social choices (i.e., whom people choose for positive interactions or roles) and relative numerical group size as two powerful cues to societal hierarchies. In Parts II and III, I show that context plays a central role in shaping the kinds of hierarchical structures that young children think are likely to emerge. Part IV then integrates these findings with other recent research to present a systematic review of the varied inputs that are likely to contribute to children's learning about societal hierarchies in the world.

Throughout this dissertation, I aim to provide conceptual nuance to research on children's thinking about societal hierarchies by disentangling children's thinking about two hierarchy-related concepts: power (i.e., dominance; control over resources and outcomes) and status (i.e., social standing; prestige or value in the eyes of others) (for example, see: Blader & Chen, 2014; Fiske et al., 2016; Magee & Galinsky, 2008; Ridgeway & Markus, 2022; Torelli et al., 2020).

Although power and status often coexist, they are likely distinct. Indeed, decades of research across the social sciences underscores the idea that social rank is not a monolithic construct (e.g., Magee & Galinsky, 2008; Maner, 2017; Redhead & Power, 2022; Van Vugt & Smith, 2019). Despite this, prior research with young children has often measured children's thinking about social rank using broad umbrella terms. For example, many studies have asked children which individual or group is "in charge" (e.g., Brey & Shutts, 2015; Dukler & Liberman, 2022; Gülgöz & Gelman, 2017; Kinzler & Dejesus, 2012; Terrizzi et al., 2019, 2020; Thomas et al., 2022), a term that could conceivably elicit thinking about either power or status. In Part II, I directly examine how young children represent different rank-related phrases (including "in charge), with a goal of providing conceptual clarity for future research. I further investigate whether young children hold dual representations of power and status structures (Part II) and whether the kinds of hierarchical structures young children think are likely to emerge depend on the specific context involved (Parts II and III).

Across the studies presented in this dissertation, I focus on children's thinking across ages 3 to 10. This wide developmental age range allows for examining whether children's thinking about societal hierarchies might shift over the early childhood years. I pay particular attention to questions of developmental change in Parts II and III, where I investigate whether children's thinking about power and status (and relatedly, dominance and prestige) unfold over the same or different developmental timelines. Throughout this dissertation, I argue that understanding the developmental timelines of thinking about different aspects of social rank can provide valuable insight into ways of thinking about the structure of society that may be most deeply rooted in cognition—and that may thus remain especially pervasive into adulthood.

Together, the findings presented across this dissertation provide evidence that children rapidly pick up on societal power and status hierarchies, from minimal cues and stripped-down stimuli (Parts I and II). Further, they suggest that children's reasoning about hierarchies is flexible and multi-faceted: Children distinguish between power and status structures (Part II) and between dominant and prestigious leaders (Part III), and they differentially employ and value the same social rank cues depending on the context involved (Parts I, II, and III). These findings illuminate some of the ways in which children may identify and navigate societal power and status structures in the real world and shed novel insight into early-life ways of thinking about societal hierarchies.

Overview of Dissertation

The chapters in this dissertation present several empirical studies of young children's thinking about societal hierarchies, with a focus on disentangling children's thinking about power and status. Part I identifies social choices—whom people choose for positive interactions, roles, or opportunities—as a powerful cue to societal hierarchies. From selection of friends to election of leaders, children observe myriad social choices. Although a single social choice may communicate limited information, patterns that emerge over time can reveal hierarchies at the individual level (which groups an agent prefers) and the societal level (which groups tend to be privileged). I first started examining this idea in prior work (Heck, Kushnir, et al., 2021). In these studies, children saw an agent and three groups of animal figurines framed as either friends (social) or toys (nonsocial). Next, children saw a box containing two of the animal groups, but not the third, and watched the agent select five items from a group that was either common (82% of the box; selections appearing random) or rare (18% of the box; selections violating random sampling). My collaborators and I found that only children who saw friends selected from the

rare group (choices appearing non-random, and thus intentional) predicted that the agent would again choose that group in the future, too. In addition, these children predicted that a member of the chosen group was most likely to be the "leader" in the fictional town (Heck, Kushnir, et al., 2021).

Thus, children track social choices to reason about status hierarchies. However, this prior research focused only on cases involving two groups, in which one group is *always* chosen, and one group is *never* chosen. In reality, social hierarchies often involve more than two groups, and representing multi-group hierarchies (of which children reflect an awareness early in life; e.g., Newheiser et al., 2014; Olson et al., 2012; Santhanagopalan et al., 2021, 2022; Yazdi et al., 2020) involves representing groups' *relative* social standing. Thus, Part I asks whether, in addition to tracking binary choices between two groups, children also track the *relative* degree to which multiple groups are chosen (e.g., A > B > C > D) to build representations of hierarchical structures that are more complex. Part I further tests for specificity in the inferences children make from patterns of social choices, contrasting children's reasoning about the groups' relative *social* standing vs. *physical* power.

In my original paper on social choices (Heck, Kushnir, et al., 2021), it stood out to me that children tended to ascribe status to members of numerically smaller social groups. This finding contrasted with existing research at the time (Lourenco et al., 2016; Pun et al., 2016), which found that infants and children ascribed power to numerically larger groups. Inspired by this disconnect, Part II asks whether children hold dual representations of power and status structures, both of which exist in the real world. In power structures (in which rank denotes control over resources or outcomes), larger groups tend to be powerful in that they have strength in numbers and are thus more likely to prevail or get their way. But for status structures (in

which rank denotes social standing based on prestige or value in the eyes of others), larger group size may not be indicative of higher social rank. Consider, for example, many occupational hierarchies and representations of social standing, which are often represented as pyramids in which numerical group size is in fact *inversely* related to social rank. Part II asks whether young children can simultaneously represent both of these kinds of hierarchical structures. Part II further examines whether young children's mental representations of power and status structures develop over the same or different developmental timelines, as well as whether social groups' specific and *relative* numerical sizes influence the kind of hierarchy children think is involved.

Part III continues investigating children's thinking about power vs. status, but shifts to examining children's reasoning about these concepts as embodied in individual leaders (i.e., the people at the top of pyramidal status structures). To capture this shift in focus, Part III uses the terms dominance and prestige, which are related to power and status, respectively, but are more often used when describing individuals (e.g., Cheng et al., 2013; Henrich & Gil-White, 2001; for discussion, see Blader & Chen, 2014). In Part III, I build on evidence that children can distinguish between power/dominance and status/prestige to ask whether children may differentially *value* different aspects of social rank in different contexts. Specifically, building on a robust literature with adults (e.g., Kakkar & Sivanathan, 2017; Laustsen & Petersen, 2017; Nettle & Saxe, 2021; Sprong et al., 2019), I ask whether young children might prioritize prestigious leaders during times of cooperation and peace, but be more likely to look for dominant leaders during times of conflict and competition. Part III further examines age-related changes in children's relative preferences for dominant and prestigious leaders and considers the potential emergence of individual differences in what children look for in leaders based on their own local sociopolitical contexts (i.e., their parents' political ideologies).

Last, Part IV concludes this dissertation by presenting a theoretical synthesis of research on the origins and development of children's thinking about societal hierarchies, with a particular focus on hierarchies between social groups (i.e., group-based hierarchies). This review synthesizes recent research, including that presented in this dissertation, to provide an overview of both *what* children learn about societal hierarchies and *how* this learning occurs. From here, this review pays particular attention to the fact that children not only learn about societal hierarchies but become active participants in them. Part IV emphasizes the importance of open questions related to the routes through which young children come to endorse or challenge the societal hierarchies about which they learn. Throughout, Part IV considers core considerations related to studying children's thinking about societal hierarchies, including: a distinction between power and status (and dominance and prestige); a distinction between children's social preferences and their thinking about social rank; the importance of context in shaping both what and how children learn about societal structures; and the role of children's own social standing and group memberships in shaping their thinking about and responses to societal power and status structures. Part IV (and this dissertation) concludes by providing a road map of open questions for future efforts to study the early-life roots of thinking about societal power and status hierarchies.

Part I: Building representations of the social world: Children extract patterns from social choices to reason about multi-group hierarchies[1]

[1] Paper in press at *Developmental Science* (Heck, Kushnir, & Kinzler, in press)

Across early childhood, children build complex mental representations of the social world. Young children categorize individuals into groups (e.g., Liberman et al., 2017; Plötner et al., 2016; Rhodes & Baron, 2019) and come to reason about how groups fit into societal structures: Children's group-based thinking increasingly mirrors real-world patterns of group-based stratification and inequity along lines of power, status, and wealth (e.g., Charafeddine et al., 2020; Kinzler & Dejesus, 2012; Mandalaywala et al., 2020; Olson et al., 2012; Santhanagopalan et al., 2021, 2022; Shutts et al., 2016; for a review, see Part IV).

Important questions involve the processes by which children construct representations of group-based hierarchies. In some cases, children may learn about group-based hierarchies directly by observing differences between groups (e.g., groups' relative resources or numerical sizes; e.g., Charafeddine et al., 2015; Horwitz et al., 2014; Pun et al., 2016; Shutts et al., 2016; see also Part II). But in other cases, children may also learn about group-based hierarchies more indirectly as they manifest in people's choices about whom to select for positive interactions, positions, and roles ("social choices"; Eason et al., 2019; Heck, Kushnir, et al., 2021). Ranging from their parents' choices of friends to their community's choices of leaders, children likely observe myriad social choices, and though a single choice may provide limited information, over time, social choices may form patterns that reveal individuals' group-based preferences as well as broader societal structures and inequities at play.

Prior research underscores social choices as meaningful cues to both people's group-based preferences and groups' relative social standing. After watching an agent repeatedly choose members of one group over another, children reasoned that the agent preferred the chosen group over the unchosen group (Eason et al., 2019; Heck, Kushnir, et al., 2021) and that members of the chosen (vs. unchosen) group were more likely to be "leaders" (Heck, Kushnir, et

al., 2021). This research suggests children track and make inferences from cases in which one group is *always* chosen and one group is *never* chosen. But many group-based hierarchies and inequities involve more complex patterns involving multiple groups, and children reflect an awareness of multi-group hierarchies early in life (e.g., Newheiser et al., 2014; Olson et al., 2012; Santhanagopalan et al., 2021; 2022; Yazdi et al., 2020). In the present studies, our goal was to investigate whether children might track not only binary choices between two groups, but also the relative degree to which multiple groups are chosen over time, to construct representations of social structures that are more complex.

We predicted that children would track the pattern that emerges across an agent's social choices (e.g., *Group-A* > *Group-B* > *Group-C* > *Group-D*) to make inferences about that agent's group-based preferences and also the groups' relative positions within a broader social structure. Across varying cultural contexts, prior work suggests close links between children's own social preferences and children's awareness of group-based hierarchies (e.g., Marshall et al., 2022; Newheiser & Olson, 2012; Shutts et al., 2016; Yazdi et al., 2020). For example, children's friend choices between members of groups other than their own tend to mirror groups' relative social standing in the world (E. E. Chen et al., 2018; Qian et al., 2019; Sacco et al., 2019; Yazdi et al., 2020). Here, we test whether the patterns that emerge in other people's social choices (e.g., those of parents, teachers, peers, and society broadly) may be one route through which children initially absorb information about group-based hierarchies and inequities in the world.

In three experiments, children (from Central New York in Experiments 1 and 2 and from 26 U.S. States in Experiment 3) observed an agent selectively choose between pairs of individuals from different social groups. Across experiments, a pattern emerged in the agent's selections (*Group-A* > *Group-B* > *Group-C* in Experiment 1; *Group-A* > *Group-B* > *Group-C* >

Group-D in Experiments 2 and 3). In Experiments 1 and 2, we asked children about the agent's group-based preferences and to predict which groups would be the "leader" and the "helper" in the town. We focused on "leader" as a role that children view as high-status (Heck, Kushnir, et al., 2021) and on "helper" as a role that children view positively (Bryan et al., 2014; Foster-Hanson et al., 2020; Van de Vondervoort & Hamlin, 2017), but that we hypothesized children would view as lower-status compared to "leader" (see also, Heck, Kushnir, et al., 2021; Santhanagopalan et al., 2022). To further examine the social specificity of children's inferences, Experiment 3 compared children's reasoning about groups' relative *social* vs. *physical* power, a trait that children associate with other positive traits (Cain et al., 1997; Fusaro et al., 2011), but about which we did not think children would make inferences based on an agent's pattern of social choices.

Experiment 1

Children saw an agent and three social groups. Children watched six events in which each possible pairing between members of different groups was presented twice. From each pair, the agent chose one individual (A > B; B > C; A > C; order of pairs counterbalanced). After, we asked children which group the agent liked most and least. To examine children's inferences about the groups' relative social standing and likelihood of being in different roles, we asked children which group was the "leader" and which group was the "helper." Last, to examine how children might integrate new groups into their existing representations of social structures, we asked children who the agent would choose between *Group-A* and a novel group and between *Group-C* and a novel group. We predicted that children would use the pattern that emerged across the agent's choices to infer the agent's group-based preferences and to predict that a member of *Group-A* was the "leader."

Methods

Participants

Participants included 36 4- to 6-year-old children (20 girls, 16 boys; M_{age} = 64.19 months; *SD* = 9.24) from Central New York. This sample size reflected counterbalancing considerations and a pre-set stopping rule. Children participated in a lab (28%), museum (47%), or camp (25%). Seventy-five percent of parents reported children's race/ethnicity. Of those, 67% identified their children as White; 15% as Hispanic or Latin(o/a/e); 7% as Other; 4% as Black or African American; 4% as Black or African American and White; and 4% as Asian or Asian American. Seventy-eight percent of parents reported family income, among whom income ranged from < $15,000 to > $150,000 with a median of $99,999.

Materials

Materials were a raccoon puppet; 10 Calico Critter ® figurines with shirts of different colors (red, yellow, green, blue); six transparent boxes; two notecards depicting cartoon faces (one happy, one neutral); and two notecards depicting stick figures (one labeled "leader," one "helper").

Figure 1.1

Stimuli presented during *Selection* in Experiment 1

Note. Pairs of friends presented during *Selection* in Experiment 1 and an example pattern of selection (red > yellow > green). Each pair was presented in a transparent box and was presented twice (resulting in six total selection events). Across participants, we counterbalanced the color assigned to each position in the hierarchy (*Group-A*, *Group-B*, *Group-C*) and the order of the pairs.

Procedure

Familiarization. Children saw "Raccoon" (the agent) and learned about three "kinds of friends" in Raccoon's town (red; yellow; green). Children heard that each group wears a different color, and that Raccoon likes some kinds of friends over others.

Selection. One at a time, children saw six selection events. Across events, each possible pairing between members of different groups (see Figure 1.1) was presented twice. Upon presenting each pair, the Experimenter said: "Look! Here are two new friends." Then, from each pair, Raccoon selected one individual. Across pairs, a pattern emerged: Raccoon selected individuals from *Group-A* over *Group-B* over *Group-C.* We counterbalanced the color in each position (A, B, C) and the presentation order of pairs.

Preference Questions. Children saw a box containing one individual from each group. In counterbalanced order, children saw one notecard depicting a happy face described as "the kind of friend Raccoon likes most" and one depicting a neutral face described as "the kind of friend Raccoon likes least." We asked children to place one kind of friend onto each notecard.

Leader and Helper Questions. In counterbalanced order, children saw two notecards and heard that one group of friends is the *leader* ("one kind of friend is the leader and always in charge of the other kinds of friends") and one group is the *helper* ("one kind of friend is the helper and always helps the other kinds of friends"). We asked children to place one kind of friend onto each notecard, thus, responses to the *Leader* and *Helper Questions* were interdependent.

Preference-extension Questions. Children learned about a new group (blue; "*Group-N*"). In counterbalanced order, children saw one box containing one friend from *Group-A* and

one friend from *Group-N* and another box containing one friend from *Group-C* and one friend from *Group-N*. For each, we asked children to predict Raccoon's choice.

Results

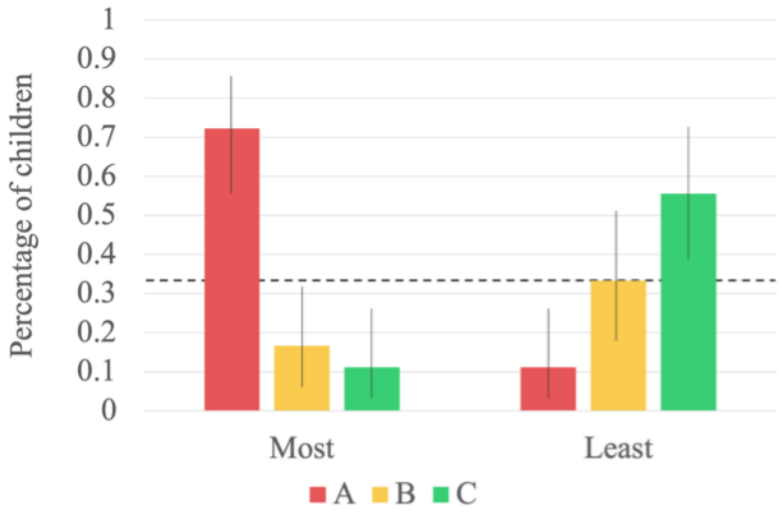
Preference Questions

Responses to the *Preference Questions* are depicted in Figure 1.2. Overall, when asked which kind of friend Raccoon liked most, children's modal response was *Group-A* (72% of children). When asked which kind of friend Raccoon liked least, children's modal response was *Group-C* (55% of children). Given the interdependence of children's responses to the two *Preference Questions,* we analyzed children's responses in conjunction. Considered this way, there are six possible ways children could respond when asked which groups Raccoon liked most and least (i.e., *Group-A* most and *Group-C* least; *Group-A* most and *Group-B* least, and so on). If children responded at chance, each possible pair of responses would be expected to occur 16.67% (1/6) of the time. We found that children's responses deviated from chance; overall they responded with some pairs of responses more than others ($\chi^2(5) = 30.33$, $p < .001$, Cramer's $V = .41$): Children responded *above* chance levels that Raccoon liked *Group-A* most and *Group-C* least (47% of children; Binomial Exact $p < .001$, 95% CI [.30, .65]) and *below* chance levels that Raccoon liked *Group-C* most and *Group-A* least (3% of children; $p = .023$, 95% CI [.00, .15]). All other pairs of responses occurred at levels expected by chance.

Multinomial logistic regression models constructed using R's "nnet" package (Venables & Ripley, 2002) revealed no significant effects of age (in months) ($\chi^2(5) = 2.81$, $p = .729$, $V = .12$); the order in which we asked the *Preference Questions* ($\chi^2(5) = 8.29$, $p = .145$, $V = .21$); or testing location ($\chi^2(10) = 11.38$, $p = .329$, $V = .18$).

Figure 1.2

Responses to the *Preference Questions* in Experiment 1



Note. The percentage of children responding with the kind of friend selected most often (*Group-A*; depicted in red), second-most often (*Group-B*; depicted in yellow), and least often (*Group-C*; depicted in green) when asked which kind of friend Raccoon likes most and least. Dotted line represents chance (33%). Error bars depict 95% Confidence Intervals.

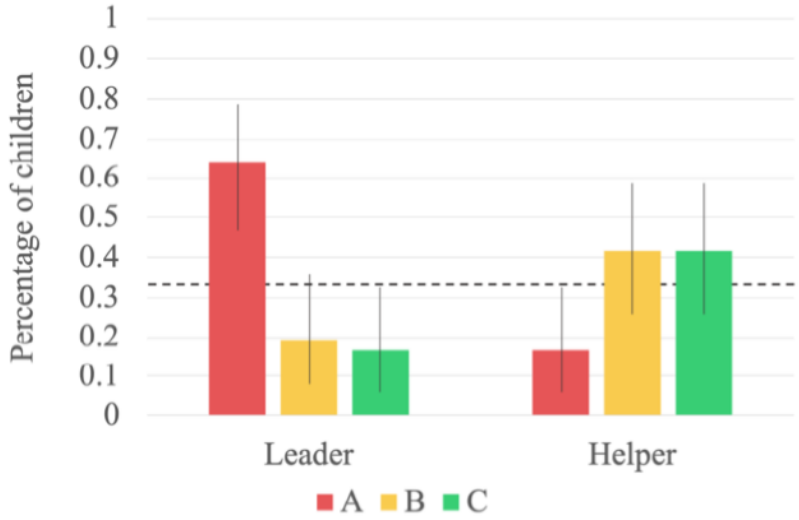
Leader and Helper Questions

Overall, when asked which group was the *leader*, children's modal response was *Group-A* (64% of children). When asked which group was the *helper*, children's modal responses were split between *Group-B* (42% of children) and *Group-C* (42% of children) (for full results, see Figure 1.3). Given the interdependence of children's responses to the *Leader* and *Helper Questions*, we analyzed children's responses to these questions in conjunction. There were again six possible ways children could respond with the three items across the two questions. Children responded with some pairs of responses more than others ($\chi^2(5) = 17.00$, $p = .005$, $V = .31$): Children's modal responses were that a member of *Group-A* was the *leader* and a member of *Group-B* was the *helper* (36% of children; above chance, $p = .005$) and that a member of *Group-A* was the *leader* and a member of *Group-C* was the *helper* (28% of children; not different from chance, $p = .111$). All other pairs of responses occurred at levels expected by chance.

Multinomial logistic regression models revealed no effects of age ($\chi^2(5) = 2.73$, $p = .741$, $V = .12$); question order ($\chi^2(5) = 23.10$, $p = .572$, $V = .15$); testing location ($\chi^2(5) = 8.58$, $p = .573$, $V = .15$); or children's responses to the *Preference Questions* ($\chi^2(5) = 4.62$, $p = .465$, $V = .16$).

Figure 1.3

Responses to the *Leader* and *Helper Questions* in Experiment 1



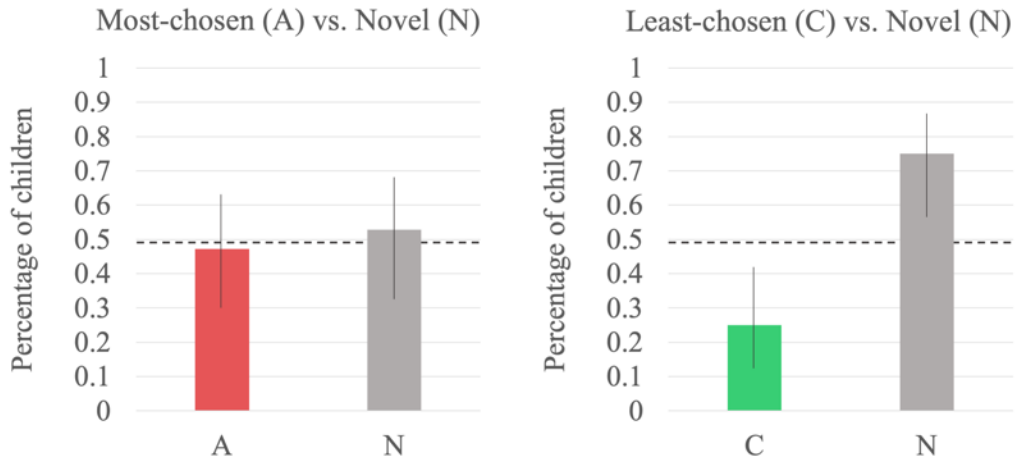
Note. The percentage of children responding with *Group-A* (depicted in red), *Group-B* (depicted in yellow), and *Group-C* (depicted in green) when asked which kind of friend is the *Leader* and the *Helper*. Dotted line represents chance (33%). Error bars depict 95% Confidence Intervals.

Preference-extension Questions. Children were split between whether Raccoon would choose *Group-A* or *Group-N* (52% said *Group-N*; not different from chance, $\chi^2(1) = 0.11$, $p = .739$, $V = .06$). In contrast, children predicted Raccoon would choose *Group-N* over *Group-C* (75% said *Group-N*; above chance, $\chi^2(1) = 9.00$, $p = .003$, $V = .50$; see Figure 1.4). Multinomial logistic regression models revealed this pattern did not vary with age ($\chi^2(3) = 3.25$, $p = .354$, $V = .17$), testing location ($\chi^2(6) = 6.09$, $p = .413$, $V = .17$), or children's responses to the *Preference*

Questions ($\chi^2(5) = 4.62$, $p = .465$, $V = .16$), but did vary depending on the order of the *Preference-extension Questions* ($\chi^2(3) = 10.01$, $p = .018$, $V = .30$; for full results).

Figure 1.4

Responses to the *Preference-extension Questions* in Experiment 1



Note. Left: The percentage of children that said Raccoon would play with a friend from *Group-A* (depicted in red) versus a novel group (*Group-N;* depicted in grey). Right: The percentage of children that said Raccoon would play with a friend from *Group-C* (depicted in green) versus *Group-N* (depicted in grey).

Discussion

Children in our sample tracked the relative degree to which different groups were chosen to predict that the group chosen most (*Group-A*) was most-preferred and the "leader" and that the group never chosen (*Group-C*) was least-preferred and unlikely to be the "leader." Children were split between whether the "helper" would be a member of *Group-B* or *Group-C*. One possibility is that different patterns of responses across the *Leader* and *Helper Questions* reflected different interpretations of this pair of roles, with some children viewing "helper" positively (even akin to an assistant to the leader) and other children viewing "helper" as a lower-status role. Children further tended to predict that the agent would choose a novel group over *Group-C*, yet were split between whether the agent would choose *Group-A* or a novel group, raising the possibility that

children reasoned about the bottom of the hierarchy as more fixed than the top.[2] Together, these findings build on prior work showing that young children track binary choices between two groups (Heck, Kushnir, et al., 2021; Eason et al., 2019), by showing that children also integrate across social choices to infer more complex preference and status hierarchies.

Experiment 2

In Experiment 2, we built on these findings in two ways. First, we aimed to replicate and extend our findings from Experiment 1 with a more complex pattern of social choices (i.e., four social groups, rather than three). Including four groups allowed us to continue examining children's ability to track the *relative* extent to which different groups are chosen and to further examine children's thinking about middle groups (i.e., those that are not *always* chosen, or *never* chosen, but chosen to varying degrees). This increase to four groups resulted in a significantly more complicated pattern of choices. Thus, in Experiment 2, we also included a wider age range of children (5- to 10-year-olds). Children again watched an agent choose between pairs of individuals from different groups. Across selections, a pattern emerged (A>B>C>D). After, we asked children which group the agent liked most, second-most, third-most, and least, allowing us to examine how many of the depicted relationships (A>B; A>C; A>D; B>C; B>D; C>D) children's responses included. We again asked children which groups were the "leader" and the "helper."

[2] In the present research, we did not pursue the *Preference-extension Questions* further due to logistical methodological constraints (we used the novel group in Experiment 1 as the fourth group children learned about in Experiments 2 and 3). The results highlight open questions related to how children integrate novel groups into their existing representations of social structures. Future research may build on this initial finding and further examine the possibility that children think differently about the flexibility of the top vs. bottom of social hierarchies.

Second, we tested whether children's inferences would depend on their explicitly hearing that the agent liked some groups more than others. One possibility is that children's reasoning in Experiment 1 depended on their hearing this information. Alternatively, children may make the same inferences from social choices with or without prior verbal scaffolding. Supporting this latter idea, prior work reveals that whereas verbal scaffolding is necessary for children to draw inferences about object preferences from an agent's object choices (Garvin & Woodward, 2015), children make inferences about social preferences from social choices even without prior verbal scaffolding (Heck, Kushnir, et al., 2021). To test between these possibilities in the present study, we randomly assigned children to hear *hierarchy framing*, in which they heard that the agent likes some groups over others (akin to Experiment 1), or *no-hierarchy* framing, in which they did not hear this information. We predicted that children's inferences would persist even without explicit verbal framing.

Methods

Participants

Participants included 98 5- to 10-year-old children (62 girls, 36 boys; M_{age} = 96.09 months; *SD* = 21.95) from Central New York. This sample size reflected counterbalancing considerations and power analyses (with medium to large effect sizes and ≥ 80% power) using R's "pwr" package (Champely, 2020). We randomly assigned children to hear *hierarchy framing* (*N* = 49; M_{age} = 95.81 months; *SD* = 22.12) or *no-hierarchy framing* (*N* = 49; M_{age} = 96.37 months; *SD* = 22.01). Children participated in a lab (57%), school (12%), museum (18%), or camp (12%). Sixty-seven percent of parents reported children's race/ethnicity. Of those, 70% identified their children as White; 9% as Other; 6% as Black or African American; 6% as Asian or Asian American and White; 3% as Asian or Asian American; 3% as Native American; 2% as

Black or African American and White; and 2% as Native American and Hispanic or Latin(o/a/e). Sixty-three percent of parents reported family income, among whom income ranged from $15,000–$19,999 to > $150,000 with a median of $75,000–$99,999.

Materials

Materials were a raccoon puppet; 16 Calico Critter ® figurines with shirts of different colors (red, yellow, green, blue); seven transparent boxes; four notecards with cartoon facial expressions ranging from happy to neutral; and two notecards depicting stick figures (one labeled “leader,” one “helper”).

Figure 1.5

Stimuli presented during *Selection* in Experiment 2

Note. Pairs of friends presented during *Selection* in Experiment 2 and an example pattern of selection (red > yellow > green > blue). Each pair was presented in a transparent box and was presented once (resulting in six total selection events). Across participants, we counterbalanced the color assigned to each position in the hierarchy (*Group-A*, *Group-B*, *Group-C*, *Group-D*) and the order of the pairs.

Procedure

Familiarization. Familiarization followed Experiment 1 except children learned about four groups (red, yellow, green, blue). In *hierarchy framing*, children heard that Raccoon likes

some groups over others. In *no-hierarchy framing*, children were asked to watch what Raccoon did without hearing this information.

Selection. Children saw each possible pairing between members of different groups (see Figure 1.5). From each pair, Raccoon chose one individual. Across pairs, a pattern emerged: Raccoon selected individuals from *Group-A* over *Group-B* over *Group-C* over *Group-D*. We counterbalanced the order of pairs and the color in each position.

Preference Questions. Children saw a box containing one member from each group and four notecards with faces ranging from happy to neutral described as: "The kind of friend Raccoon likes… (1) …most"; (2) …second-most"; (3) …third-most"; and (4) …least." We asked children to arrange the four groups on the four notecards.

Leader and Helper Questions. Questions were identical to those in Experiment 1. Responses to the *leader* and *helper* questions were again interdependent.

Results

Preference Questions

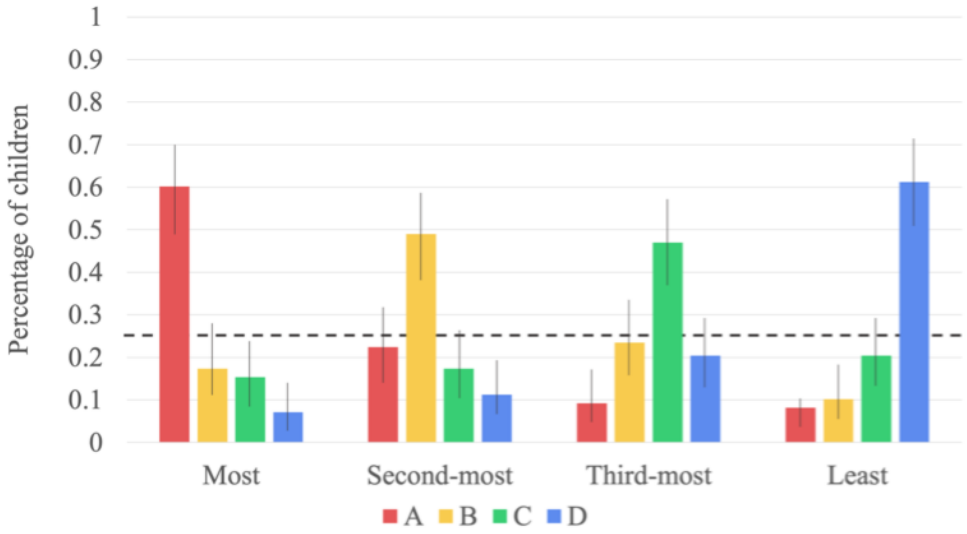
When asked which kind of friend Raccoon likes most, second-most, third-most, and least, children's modal responses were *Group-A* for "most" (60% of children), *Group-B* for "second-most" (49% of children), *Group-C* for "third-most" (47% of children), and *Group-D* for "least" (61% of children). Full results for the *Preference Questions* are presented in Figure 1.6.

Given the interdependence of children's responses to the four *Preference Questions*, we again analyzed children's responses in conjunction. Considered this way, there were 24 possible orders in which children could arrange the four groups across the four notecards. Given the large number of possible response permutations (24), we analyzed children's responses with respect to the number of depicted relationships (A>B; A>C; A>D; B>C; B>D; C>D) each child's response

included. One order (ABCD) includes all six depicted relationships. Three orders (ABDC, ACBD, BACD) include five; five orders (ACDB, ADBC, BADC, BCAD, CABD) include four; six orders (ADCB, BCDA, BDAC, CADB, CBAD, DABC) include three; five orders (BDCA, CBDA, CDAB, DACB, DBAC) include two; three orders (CDBA, DBCA, DCAB) include one; and one order (DCBA) includes none. If children arranged the groups at random, each order would be expected to occur 4.2% (1/24) of the time. Thus, by chance, children would be expected to include all six depicted relationships 4.2% of the time, five relationships 12.5% of the time, four relationships 20.8% of the time, three relationships 25% of the time, two relationships 20.8% of the time, one relationship 12.5% of the time, and zero relationships 4.2% of the time.

Figure 1.6

Responses to the *Preference Questions* in Experiment 2



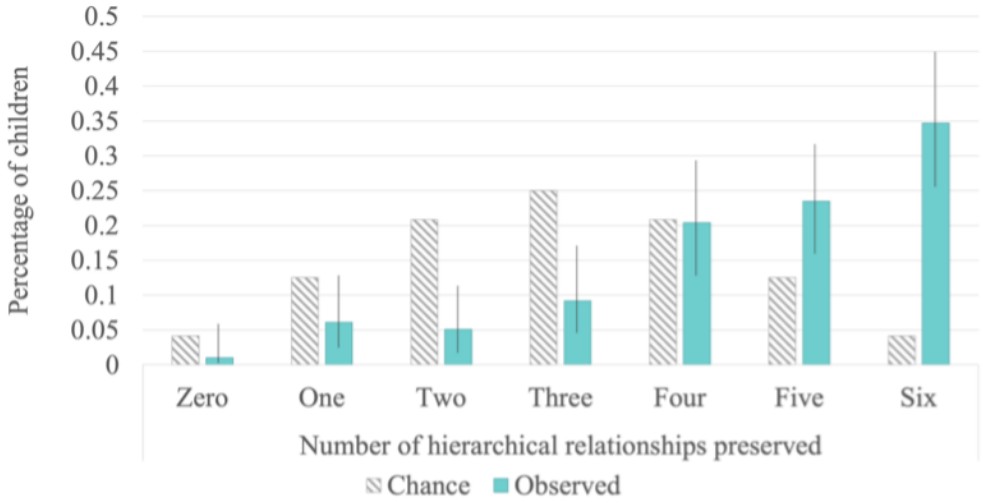
Note. The percentage of children responding with Group-A (depicted in red), Group-B (depicted in yellow), Group-C (depicted in green), and Group-D (depicted in blue) when asked which kind of friend Raccoon likes most, second-most, third-most, and least. Dotted line represents chance (25%). Error bars depict 95% Confidence Intervals.

The observed pattern deviated from that expected by chance (Fisher Exact Test $p < .001$; see Figure 1.7). Children's arrangements included six and five relationships more than chance

(six: Binomial Exact $p < .001$, 95% CI [.25, .45]; five: $p = .003$, 95% CI [.16, .33]) and included four, three, two, one, and zero of the relationships less than or at levels expected by chance (four: $p = 1.00$, 95% CI [.13, .30]; three: $p < .001$, 95% CI [.04, .17]; two: $p < .001$, 95% CI [.02, .12]; one: $p = .065$, 95% CI [.02, .13]; zero: $p = .196$, 95% CI [.00, .06]).

Figure 1.7

Number of hierarchical relationships included in children's responses to the *Preference Questions* in Experiment 2



Note. The percentage of children expected by chance (dashed grey bars) to preserve zero, one, two, three, four, five, and six of the hierarchical relationships (A>B; A>C; A>D; B>C; B>D; C>D) depicted across the *Preference Questions* in Experiment 2 and the observed percentage of children (solid turquoise bars) who preserved each number of relationships. Error bars depict 95% Confidence Intervals.

We examined whether this pattern changed with age or varied depending on whether children were explicitly told that Raccoon liked some friends over others (i.e., framing). A generalized linear regression model constructed using R's "stats" package (R Core Team, 2022) revealed a significant effect of age ($\chi^2(1) = 17.16$, $p < .001$, $V = .42$): With age, children included an increasing number of the depicted relationships in their responses. Children's responses did not vary based on framing ($\chi^2(1) = 0.60$, $p = .440$, $V = .08$).

Generalized linear regression models revealed no effects of order ("likes most" on left vs. right; $\chi^2(1) = 0.35$, $p = .557$, $V = .06$) or testing location ($\chi^2(3) = 0.39$, $p = .942$, $V = .06$).

Leader and Helper Questions

Overall, when asked which group was the *leader*, 37% of children said *Group-A*; 26% of children said *Group-B*; 16% of children said *Group-C*; and 21% of children said *Group-D* (significantly different from chance; $\chi^2(3) = 8.86$, $p = .031$, $V = .17$). When asked which group was the *helper*, 36% of children said *Group-A*; 24% of children said *Group-B*; 15% of children said *Group-C*; and 24% of children said *Group-D* (significantly different from chance; $\chi^2(3) = 8.20$, $p = .042$, $V = .17$).

Given the interdependence of children's responses to the *Leader* and *Helper Questions*, we further analyzed responses to these questions in conjunction. Considered this way, there were 12 possible ways children could respond with the four items to the two questions. If children responded at chance, then each pair of responses would be expected to occur 8.33% (1/12) of the time. Children were significantly more likely to provide some pairs of responses than others ($\chi^2(11) = 28.86$, $p = .002$, $V = .16$): Specifically, children's most common responses were that (1) a member of *Group-A* was the *leader* and a member of *Group-B* was the *helper* (16% of children; above chance, $p = .009$, 95% CI [.10, .25]); (2) a member of *Group-B* was the *leader* and a member of *Group-A* was the *helper* (14% of children' above chance, $p = .042$, 95% CI [.08, .23]); (3) a member of *Group-D* was the *leader* and a member of *Group-A* was the *helper* (14% of children; above chance, $p = .042$, 95% CI [.08, .23]); and (4) a member of *Group-A* was the *leader* and a member of *Group-D* was the *helper* (12% of children; not different from chance, $p = .196$, 95% CI [.06, .20]).

Multinomial logistic regression models revealed no effects of age ($\chi^2(11) = 8.90$, $p = .631$, $V = .09$), framing ($\chi^2(11) = 8.59$, $p = .660$, $V = .09$), question order ($\chi^2(11) = 8.79$, $p = .641$, $V = .09$), testing location ($\chi^2(33) = 46.67$, $p = .058$, $V = .12$), or children's responses to the *Preference Questions* ($\chi^2(5) = 9.84$, $p = .545$, $V = .16$).

Discussion

Children in our sample used the relative degree to which an agent selected members of different social groups to infer that agent's group-based social preferences. Children tracked the agent's choices to make social inferences whether or not they heard explicit verbal scaffolding (*hierarchy-framing*), mirroring past work (Heck, Kushnir, et al., 2021), and suggesting that children may view social selection as inherently based on social preferences from an early age.

Children's reasoning on the *Preference Questions* also changed with age: Across ages 5 to 10, children's inferences increasingly reflected the agent's social choices. However, given that younger children's reasoning was robust when presented with a simpler paradigm in Experiment 1, these age effects may reflect general cognitive improvements (e.g., increased attention, better working memory) rather than changes in children's reasoning about social choices specifically. At the same time, these age effects point to the role that domain-general developmental changes may play in children's ability to extract patterns from people's social choices in the world.

When asked which groups were the "leader" and the "helper," children seemed to consider the social choices they had observed when responding to these questions. In other words, children did not respond at random; children tended to respond either with *Group-A* and *Group-B* (in either order across "leader" and "helper") or with *Group-A* and *Group-D* (in either order across "leader" and "helper"). However, unlike in Experiment 1, we did not see evidence in Experiment 2 that children thought "leaders" would be more likely than "helpers" to be groups

that were chosen more often. One possibility is that children's differential responses reflected variation in how children conceptualized the roles "leader," "helper," and their relation to one another. Indeed, recent research underscores a potential duality in children's thinking about the relation between leading and helping: On the one hand, children view helping others as an important aspect of leadership (Stavans & Diesendruck, 2021), but on the other hand, children associate being helpful with *not* being "in charge" (Terrizzi et al., 2020). Another possibility is that some children—specifically those who said that *Group-D* was the "leader" and that *Group-A* was the "helper"—were attempting to rectify the biased pattern of choices they observed (e.g., Olson et al., 2011; Elenbaas et al., 2016; Rizzo et al., 2020; for a review, see Part IV) particularly given that this response was more common among older (vs. younger) children (79% of children providing this response were age 8 or older).

Together, children's responses to the *Leader* and *Helper Questions* in Experiment 2 raise important questions about how children conceptualize being a "helper," and how children of different ages respond to biased patterns of social selection. At the same time, variation in children's responses—and the interdependence of the *Leader* and *Helper Questions*—make it challenging to draw conclusions specifically regarding children's thinking about the groups' relative social standing. For this reason, our goal in Experiment 3 was to more directly focus on children's reasoning about each group's relative social rank. To do so, we used a new dependent variable and focused on a comparison trait that is positive, but less ambiguous in its relation to social status.

Experiment 3

In Experiment 3, we focused more directly on children's inferences about the groups' relative social standing and used a new dependent variable that assessed children's thinking

about each group independently. Children watched an agent choose between pairs of individuals from four social groups. Across selections, a pattern emerged in the agent's choices (A>B>C>D). After, we asked children to indicate each group's placement on a ladder—a measure that has recently been used to assess children's awareness of group-based hierarchies in the world (see Mandalaywala et al., 2020; Marshall et al., 2022; Yazdi et al., 2020). To test for further specificity in children's reasoning, we described the ladder between-participants as representing either the groups' relative *social* power or the groups' relative *physical* power, a trait that young children associate with other positive traits (Cain et al., 1997; Fusaro et al., 2011), but about which we did not expect children to make inferences based on the agent's social choices. Thus, this comparison aims to disentangle between the possibility that children would use the agent's pattern of social choices to arrange the groups hierarchically along any positive dimension (i.e., a broader "halo effect"), and the possibility that children display greater specificity in their reasoning. This comparison also adds to a growing body of work focused on distinguishing between children's reasoning about various hierarchy-related concepts (e.g., status vs. power; prestige vs. dominance; see Margoni et al., 2018; Kajanus et al., 2020; see also Part II). We predicted that children's placement of the groups would mirror the pattern across the agent's choices when asked about the groups' relative *social* but not *physical* power. We pre-registered the design, analyses, and predictions for this experiment (https://osf.io/5rvtz/?view_only=4bff6c1ddb21443da89ca01ab8570534).

Methods

Participants

Participants included 96 5- to 10-year-old children (48 girls, 46 boys, 2 non-binary; M_{age} = 96.30 months; *SD* = 21.27) from 26 U.S. States. This sample size reflected counterbalancing

considerations and power analyses (allowing us to detect mean differences of one ladder rung with 90% power). We randomly assigned children to *social power* (N = 48; M_{age} = 96.27; SD = 20.95) or *physical power* (N = 48; M_{age} = 96.33 months; SD = 21.81). Children participated remotely via Zoom. Ninety-eight percent of parents reported children's race/ethnicity, of whom, 60% identified their children as White; 15% as Asian or Asian American; 6% as Hispanic or Latin(a/o/e) and White; 5% as Hispanic or Latin(o/a/e); 4% as Black or African American; 2% as Native American or Alaska Native and Hispanic or Latin(o/a/e); 2% as Black or African American and Hispanic or Latin(o/a/e) and White; 1% as Black or African American and White; 1% as Native Hawaiian or Pacific Islander; 1% as Native American or Alaska Native; and 1% as Native American or Alaska Native and Asian or Asian American. Ninety-seven percent of parents reported family income, among whom income ranged from < $15,000 to > $150,000 with a median of $100,000–$149,999.

Materials

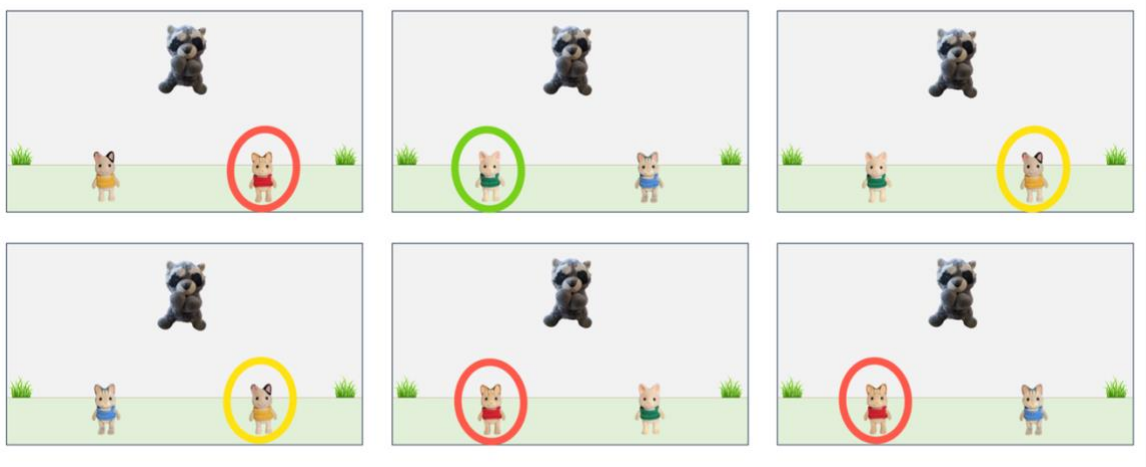
Procedure

Familiarization. Familiarization followed the *no-hierarchy* framing of Experiment 2 but was adapted for online testing via Zoom. Children saw a picture of Raccoon and learned about four groups in Raccoon's town (red, yellow, green, blue).

Selection. Children saw each possible pairing between individuals from different groups. For each pair, children watched an animation in which Raccoon moved from the top of the screen toward one of two individuals at the bottom of the screen (see Figure 1.8). Across pairs, a pattern emerged (*Group-A* > *Group-B* > *Group-C* > *Group-D*). We counterbalanced the color of each group and the sides to which Raccoon moved.

Figure 1.8

Stimuli presented during *Selection* in Experiment 3

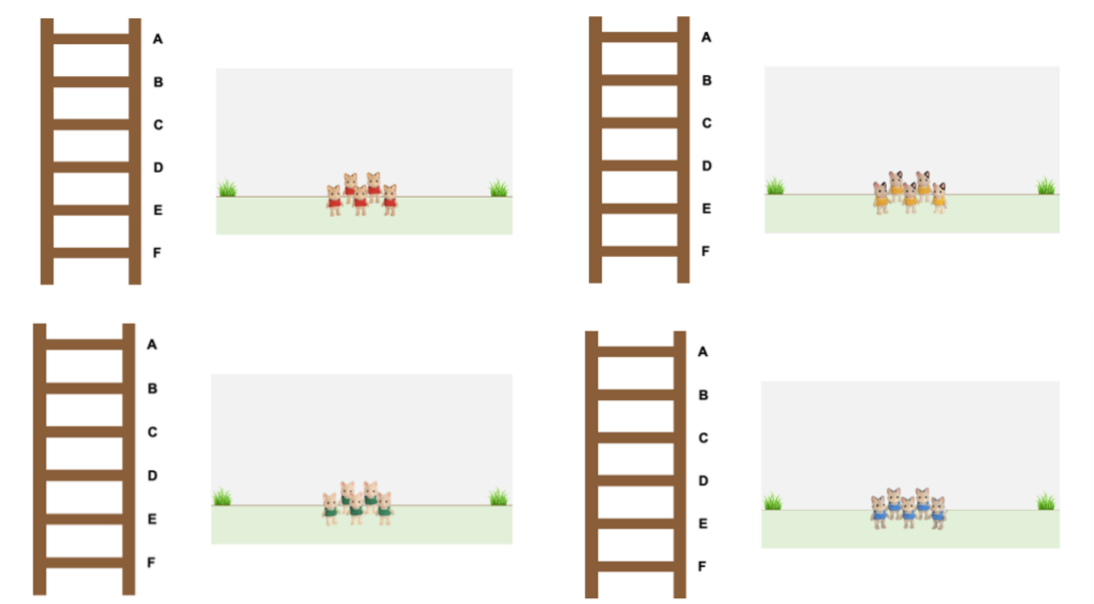


Note. Pairs of friends presented during *Selection* in Experiment 3 and an example pattern of selection (red > yellow > green > blue). Each pair was presented on a Powerpoint slide. Across participants, we counterbalanced the color assigned to each position in the hierarchy (*Group-A*, *Group-B*, *Group-C*, *Group-D*) and the sides to which Raccoon moved.

Ladder questions. Children saw a depiction of a ladder with six rungs labeled A–F (see Figure 1.9). Between-subjects, we described this ladder as representing the extent to which each group is "the leader" (*social power*) or the extent to which each group is "the strongest" (*physical power*). In counterbalanced order, we showed children each group one at a time (four total) and for each, asked children to indicate (using the letters) where on the ladder the group goes.

Figure 1.9

Stimuli presented during the *Ladder Questions* in Experiment 3



Note. Stimuli presented during the *Ladder Questions* in Experiment 3. For each group, we asked children to indicate the group's placement on the ladder using the letters. Across participants, we counterbalanced the order in which groups were presented.

Results

We numerically coded children's placement of each group on the ladder, with higher numbers indicating higher placement on the ladder (i.e., A = 6, B = 5, C = 4, D = 3, E = 2, F = 1; see Figure 1.10). To examine whether children's placement of groups on the ladder depended on condition (*social power*, *physical power*), the group children were placing (i.e., the group chosen most, second-most, third-most, or least), or these factors' interaction, we constructed a linear mixed effects model using R's "lme4" package (Bates et al., 2015) with ladder placement as the outcome and a random-intercept for each participant. As predictors, we included group (most, second-most, third-most, or least chosen), condition (*social power* vs. *physical power*), these factors' interaction, and children's age (in months).

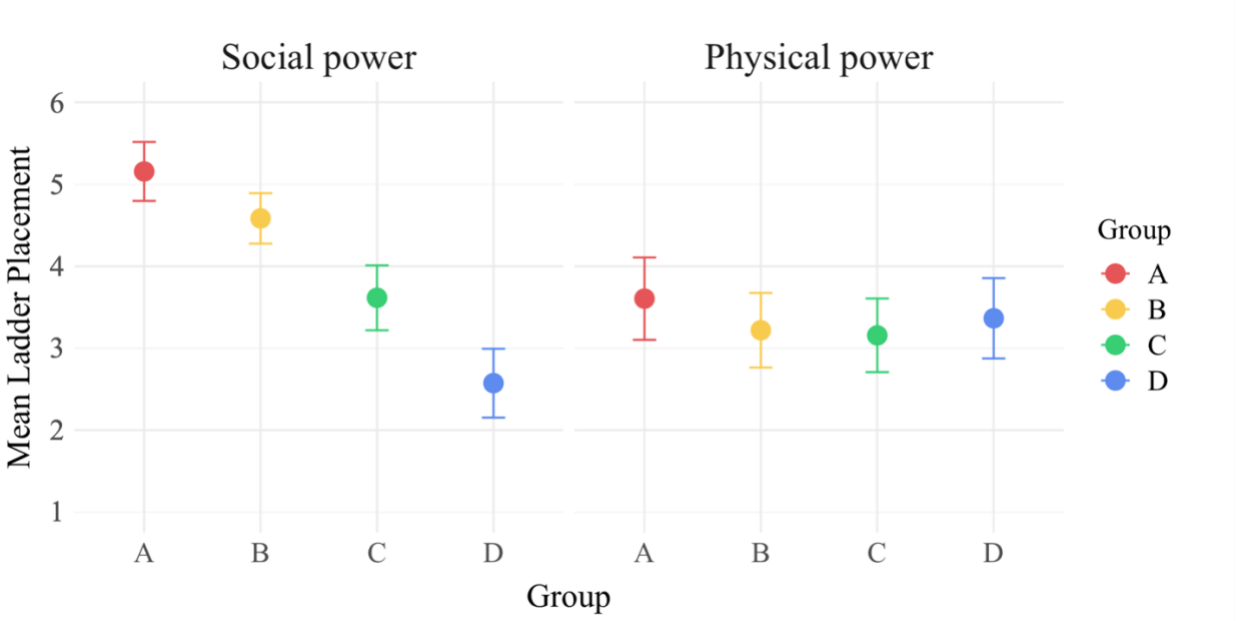
There was a significant interaction between group and condition ($\chi^2(3) = 40.42$, $p < .001$, $V = .37$): Children's relative placement of the four groups mirrored the agent's pattern of choices when the ladder was framed as depicting *social power*, but not *physical power* (see Figure 1.9). In *social power*, children placed *Group-A* ($M_{ladder} = 5.16$) above *Group-B* ($M_{ladder} = 4.58$) above *Group-C* ($M_{ladder} = 3.61$) above *Group-D* ($M_{ladder} = 2.57$), and all of children's mean placements of groups differed from one another (all p's < .045, using the Bonferroni-Holm correction for multiple comparisons). Moreover, children tended to place *Group-A* ($t(47) = 9.27$, $p < .001$, 95% CI [4.78, 5.52]) and *Group-B* ($t(47) = 7.09$, $p < .001$, 95% CI [4.28, 4.89]) above the midpoint of the ladder (i.e., 3.5), *Group-C* at the midpoint ($t(47) = 0.11$, $p = .564$, 95% CI [3.22, 4.01]) and *Group-D* below the midpoint ($t(47) = –4.44$, $p < .001$, 95% CI [2.15, 2.99]). In contrast, in *physical power*, none of children's mean placements of groups differed from one another (all p's > .587), or from the mid-point of the ladder (i.e., 3.5; all p's > .440).

Further, comparing across conditions, children in *social power* (compared to children in *physical power*) placed *Group-A* ($t(85.1) = 5.05$, $p < .001$, 95% CI [0.94, 2.16]) and *Group-B* ($t(82.5) = 5.00$, $p < .001$, 95% CI [0.82, 1.91]) significantly higher on the ladder and placed *Group-D* ($t(91.9) = –2.47$, $p = .021$, 95% CI [–1.43, –0.15]) significantly lower on the ladder. Children's placements of *Group-C* did not differ between conditions ($t(92.6) = 1.54$, $p = .127$, 95% CI [–0.13, 1.05]).

There was no significant effect of age on children's ladder placements ($\chi^2(1) = 0.45$, $p = .502$, $V = .07$), nor did the interaction between group and condition vary with age ($\chi^2(3) = 0.425$, $p = .929$, $V = .04$). Linear mixed effects models revealed that these patterns did not vary depending on the order in which children were asked to arrange the groups ($\chi^2(9) = 4.28$, $p = .893$, $V = .07$).

Figure 1.10

Responses to the *Ladder Questions* in Experiment 3 by condition



Note. Children's mean placement of each group (*Group-A, Group-B, Group-C, Group-D*) on the ladder, split by condition (*social power, physical power*). Higher numbers on the y-axis indicate higher placement on the ladder (1 = A; 2 = B; 3 = C; 4 = D; 5 = E; 6 = F; see Figure 1.9).

Discussion

Children's placement of novel groups on a status ladder paralleled the pattern that emerged in an agent's choices between members of those groups: Children placed *Group-A* above *Group-B* above *Group-C* above *Group-D* on the ladder. These findings extend and clarify our results from Experiments 1 and 2, and point to the patterns that children observe in people's social choices as a mechanism through which children might learn about multiple groups' relative positions and treatment within societal structures.

Notably, children did not infer differences between the relative *physical* power of the different groups. In this case, children tended to arrange the groups randomly, seemingly not viewing the agent's social choices as indicative of the groups' relative strength. Given that children view "strength" positively and that this trait has been considered in the broader "halo

effect" literature (Cain et al., 1997; Fusaro et al., 2011; Hermes et al., 2021), this finding provides initial evidence that children do not use the pattern of an agent's social choices to arrange groups along just any positive dimension.

One possibility is that children did not make systematic inferences about the groups' relative *physical* power simply because they could see that the stimuli were similar in size. At the same time, prior work suggests that children can represent differences in individuals' strength even when those individuals do not *appear* different from one another (e.g., see Fusaro et al., 2011). Moreover, children in the *physical power* condition often spontaneously mentioned that certain groups looked bigger or stronger than others, even though they were in fact the same size. Reflecting this, although children did not use the agents' choices to guide their predictions of groups' physical strength, children in the *physical power* condition did tend to place the groups on different ladder rungs. In fact, only four of 48 children in the *physical power* condition placed all four groups on the same ladder rung—a response that would likely occur more often if children had simply responded based on a judgment that the stimuli appear similar in size.

That children made inferences about groups' relative *social* but not *physical* power raises questions about the scope of inferences children make from others' positive social choices. For example, future research may test whether children use patterns of social choices to make predictions about groups' relative skills or wealth, among other traits. Other questions involve how the inferences children make from social choices may vary in more specific contexts. For example, had children learned that the agent was choosing individuals for a sports team, children may then have viewed the agent's choices as indicative of the groups' relative strength (and perhaps not their relative status). Our results suggest that in broader social contexts, there may be

a particularly close link between children's observations of others' positive social choices and their thinking about group-based status hierarchies.

General Discussion

Children in our samples used the pattern that emerged across an agent's social choices between groups to reason about that agent's preferences and the relative social standing of the different groups. These findings underscore a mechanism through which children might learn about group-based attitudes at both the individual level (which groups an individual agent prefers) and the societal level (which groups are higher-status or privileged) through their observations of people's affiliative choices over time.

By early childhood, children's own social choices mirror groups' relative social standing in the world (Chen et al., 2018; Qian et al., 2019; Sacco et al., 2019; Santhanagopalan et al., 2022; Yazdi et al., 2020). The present findings suggest that one way in which children *initially* learn about societal structures and inequities may be through their observations of *other* people's social choices (e.g., those of parents, teachers, peers, and society broadly). The present findings also raise the possibility that observing less biased patterns of social choices (e.g., a parent who chooses diverse friends; a country that elects leaders that are representative of its people) may lead children to develop more egalitarian (vs. hierarchical) social attitudes. Relatedly, showing children patterns of social choices that mismatch those they have observed before (akin to observing "counterstereotypes"; see Block et al., 2022; Gonzalez et al., 2016, 2021) may be one way to reshape social attitudes that children have already formed.

Much past research on children's learning about group-based social attitudes has focused on children's learning about at most two groups at a time, and yet children reflect an awareness of multi-group hierarchies beginning early in life (e.g., Newheiser et al., 2014; Olson et al., 2012;

Santhanagopalan et al., 2021; 2022; Yazdi et al., 2020). The present findings build on past work to suggest that children track not only binary choices between two groups (see Eason et al., 2019; Heck, Kushnir, et al., 2021), but also the relative degree to which multiple groups are chosen compared to one another. Though the present research focused specifically on patterns of social choices, our findings may also point to a broader mechanism through which children track patterns in social inputs. Supporting this possibility, children learn about dominance hierarchies involving multiple individuals by piecing together dyadic relations between pairs of individuals (Mascaro & Csibra, 2014; see also Gazes et al., 2017). Future research may examine whether children come to notice patterns over time in other social inputs (e.g., positive vs. negative nonverbal cues, Skinner et al., 2017; whether or not groups receive help, Sierksma & Shutts, 2020; whether groups are mentioned or unmentioned, Moty & Rhodes, 2021; to name just a few examples) to construct representations of social structures involving *more than two* individuals or groups.

Our findings also raise questions about how children's learning from social choices may operate in the world. We presented a stripped-down context involving novel groups and a clear-cut pattern of choices to test a general mechanism. But real-world patterns of social choices are messier. Open questions concern how children might integrate patterns of social choices made by multiple different agents or as observed in multiple kinds of inputs (e.g., social choices observed first-hand vs. as depicted in media or educational materials). Other questions involve whether children consider what choices are possible for an agent to make (e.g., which groups are present in an environment) (see also Pesowski et al., 2016) and whether children's inferences might differ depending on how salient groups that are not chosen may be (e.g., in more or less diverse environments; see Eason et al., 2019).

Another critical question is how children's perceptions of their own and others' social status (including the person or institution making social choices) influence the way they track social choices. Though our paradigm involved novel rather than real-world status hierarchies, children's exposure to social status, and their own experiences within societal hierarchies, likely influence how children reason even in novel situations, and these influences are likely to grow stronger over childhood (e.g., Rhodes & Gelman, 2009). With this in mind, it is important to note the major limitation that our sample is from a "WEIRD" cultural context (see Amir & McAuliffe, 2020) and—particularly in Experiments 1 and 2—was predominately White and middle to upper class. Children in our sample, then, who are mostly coming from a relatively high-status (privileged) position, may have certain experiences and representations of a link between social preferences and status that shape their reasoning. We see this not as a limitation of the novel-groups methodology per se, but rather as a call for testing broader populations of children to understand how children's early-life contexts and experiences influence the way they track and interpret patterns of social choice.

Together, the present studies underscore the patterns that emerge in people's affiliative behaviors over time as a cue through which children might learn about the structure of the social world through their observations of everyday interactions. Continued efforts to understand how children come to represent social structures offer a lens into how societal systems become reflected in individuals' minds, and into how social biases that might develop in parallel with these representations may be mitigated and reshaped.

Part II: Small groups lead, big groups control: Perceptions of numerical group size, power, and status across development[1]

[1] Paper published in *Child Development* (Heck, Bas, & Kinzler, 2022)

Groups are a defining feature of the social world. Social groups shape people's identities, with whom they affiliate, and with whom they compete. The salience of social groups is reflected in children's early recognition of and reasoning about them (Liberman et al., 2017; Plötner et al., 2016; Rhodes, 2013; Rhodes & Baron, 2019; Weisman et al., 2015; Ziv & Banaji, 2012). Within the first years of life, children attend to different social group markers (e.g., gender, race, language, nationality, as well as the intersection of identities) (Bar-Haim et al., 2006; Diesendruck & HaLevi, 2006; Kinzler et al., 2007; Liben & Bigler, 2002; May et al., 2019; Perszyk et al., 2019; Quinn et al., 2002) and use group membership to reason about individuals' and groups' relative preferences (Liberman et al., 2016; Roberts et al., 2017; Shutts et al., 2013), abilities (Bian et al., 2017; Cvencek et al., 2011), and social rank (Charafeddine et al., 2020; Kinzler & Dejesus, 2012; Mandalaywala et al., 2020; Olson et al., 2012; Ramsey, 1991).

A relatively understudied—yet always present and important—feature of social groups is their relative numerical size. Numerical group size may influence expectations of groups, and their relations to one another, in complex ways. Larger groups possess "strength in numbers," and are thus more likely to prevail in situations of competition (J. H. Brown & Maurer, 1986; Nishida & Hosaka, 1996; Pietraszewski & Shaw, 2015; Pun et al., 2016, 2017; Wilson & Wrangham, 2004). Yet, there exist other dimensions of social hierarchy in which larger numerical group size may be less indicative of higher social rank. In other contexts, social hierarchies can take a pyramidal structure, with a numerically smaller group of individuals ascribed the highest rank (Magee & Galinsky, 2008; Yu et al., 2019; Zitek & Tiedens, 2012). Existing research on children's reasoning about numerical group size focuses almost exclusively on situations that invoke thinking about power, suggesting an appreciation of a potential association between larger group size and power is present early in life. For instance, infants and

preschoolers expect members of numerically larger groups to prevail over members of smaller groups (Lourenco et al., 2016; Pun et al., 2016). However, it remains unknown whether children reason flexibly about the relation between numerical group size and hierarchy, depending on the context.

The current project tested the conditions under which children and adults ascribe greater social rank to numerically larger versus smaller social groups. A lengthy literature distinguishes between power-based hierarchies (i.e., control over resources) and status-based hierarchies (i.e., respect, competence, or skill) (Blader & Chen, 2014; J. T. Cheng et al., 2013; Hawley, 2015; Henrich & Gil-White, 2001; Magee & Galinsky, 2008). We posited that whether children perceive a numerically larger or smaller group as higher in social rank would depend on whether the context elicits reasoning about power- or status-based hierarchies. We were especially interested in how reasoning about group-based power and status unfolds over development, and whether conceptions of power and status depend on the ratio between groups' sizes.

With respect to power-based hierarchies, numerically larger groups are powerful in that they are physically more likely to prevail over numerically smaller groups. This is reflected in the reasoning and behavior of non-human animals, infants, young children, and adults (Batchelor & Briffa, 2011; Cao & Banaji, 2016; Lourenco et al., 2016; McComb et al., 1994; Pietraszewski & Shaw, 2015; Pun et al., 2016, 2017; Wilson & Wrangham, 2004). For instance, a group of lionesses is more likely to approach audio of another group of lionesses when that group is numerically smaller (1 vs. 3 lions) and this decision depends on the size of the lioness' own group compared to the number in the recording (McComb et al., 1994). Male chimps will approach a recording of another chimp, but only if the chimp's own group contains greater than three individuals (Wilson et al., 2001). Adults likewise associate greater physical dominance

with numerically larger groups (Cao & Banaji, 2016; Lourenco et al., 2016) and even infants and preschoolers expect members of numerically larger groups to win when two groups are in conflict (Lourenco et al., 2016; Pun et al., 2016, 2017; Thomsen, 2020). In sum, there is extensive evidence that non-human animals, children, and adults associate greater power with numerically larger groups. Given this evidence, one possibility is that both children and adults always expect numerically larger groups to hold greater social rank.

Yet, for status-based hierarchies, greater numerosity may be less indicative of higher social rank. For example, consider many organizational and occupational hierarchies, or many country's distributions of wealth. As of 2020, the wealthiest 1% of individuals in the United States hold over 30% of the country's total wealth (Federal Reserve, 2020). Among adults, the prevalence of real-world cases in which numerically smaller groups hold status is reflected in people's minds: Adults explicitly predict that numerically smaller groups hold greater status and competence (Cao & Banaji, 2016). Synthesizing recent research with children provides hints that a dual consideration of power and status of social groups may be present early in life. For instance, whereas infants use body size to predict which of two agents will achieve its goal in a zero-sum conflict (Thomsen et al., 2011), infants fail to consider body size when predicting which agent will prevail in a situation that does not involve conflict (Thomsen, 2020). Moreover, preschoolers infer that members of numerically smaller social groups that are preferred by others are most likely to be leaders (Heck, Kushnir, et al., 2021) and children attend to the relation between wealth and different social groups in their society, including in situations where a numerically smaller group holds a greater amount of wealth (Olson et al., 2012).

Thus, there exist group-based social hierarchies in different contexts in which higher social rank tends to be associated with both numerically larger and with numerically smaller

groups. Open questions concern when in life children reflect this duality in their reasoning, and how an association between social group size and hierarchy develops. Here, we directly probed the flexibility of the relation between numerical group size and social hierarchy, depending on whether the context elicits thinking about power- or status-based hierarchies.

We were particularly interested in whether the developmental trajectories of children's reasoning about the relation between numerical group size and hierarchy changes with age. Past literature raises the possibility that thinking about status may have a relatively prolonged developmental trajectory. Although even infants can distinguish between fear- and respect-based authority figures (Margoni et al., 2018), children's reasoning about different kinds of social rank undergoes development. In one study, although children distinguished between dominance- and prestige-based forms of social rank by age 5, children improved at distinguishing between dominance and prestige over the elementary school years (Kajanus et al., 2020). Children's preference for dominant agents (Bernard et al., 2016; Castelain et al., 2016; Charafeddine et al., 2016; Enright et al., 2017; Thomas et al., 2016) also appears to weaken over development (Charafeddine et al., 2016). Whereas preschoolers on average allocate more resources to a dominant agent than to a subordinate, 8-year-old children overwhelmingly prefer to give resources to a subordinate (Charafeddine et al., 2016). Adults also explicitly associate higher status with numerically smaller groups, although they implicitly associate greater status with numerically larger groups (Cao & Banaji, 2016). One possibility is that this distinction between adults' explicit judgments and implicit associations reflects a continued difference in the developmental trajectories of reasoning about power and status.

We were also interested in whether the ratio between a numerically larger and smaller group may shape which group is seen as higher in social rank. Existing research has considered

the comparative sizes of social groups (i.e., a "larger" and a "smaller" group) but has not varied the ratio between them. Past research has used group size ratios of 2:3 (Cao & Banaji, 2016; Pun et al., 2016) and 1:2 (Lourenco et al., 2016). But it is unknown whether the ratio between groups' sizes influences the perceived relation between numerical group size and social rank. For considerations of status, groups' relative numerical sizes may be especially important. Often, status-based hierarchies take a pyramidal shape, with the highest status conferred to only a subset of individuals (Magee & Galinsky, 2008; Yu et al., 2019; Zitek & Tiedens, 2012). As such, the rarer a smaller group is, the more likely the situation may be to bring to mind status hierarchies in which numerical group size and social rank are inversely related. To test this idea in the present studies, we varied the ratio between two groups' numerical sizes and examined whether group size ratio impacted the perceived relation between numerical group size and social rank.

In the present studies, we showed adults and children across a wide developmental age range cartoon depictions of 20 individuals divided into two social groups. We varied the groups' relative numerical sizes such that the individuals were divided into groups of 1 and 19 people, 2 and 18 people, 5 and 15 people, or 8 and 12 people. Across three experiments, we asked children and adults which group was "in charge" (Experiment 1), "the leader" (Experiment 2), and most likely to "get the stuff" in their town (Experiment 3). We first asked which group was "in charge" because this phrase could conceivably elicit representations of power and status and has been shown to be understood by even young children (Charafeddine et al., 2016; Gülgöz & Gelman, 2017; Kinzler & Dejesus, 2012; Terrizzi et al., 2020). We anticipated that a tendency to associate greater status with numerically smaller groups would increase with age and depend on the ratio between the groups' numerical sizes. In Experiment 2, we replicated and extended the findings from Experiment 1 by asking which group is "the leader," a framing of hierarchy we

thought would be especially likely to elicit an association between numerically smaller groups and higher social rank. In Experiment 3, we compared these two cases to a case involving resource competition (which group would "get the stuff"), a context we thought would invoke reasoning about the power of the larger group and thus be consistent across age and relative group size.

Experiment 1

We presented children and adults with visual depictions of two social groups and asked participants which group was "in charge." Between subjects, we varied the ratio between the groups' numerical sizes. We predicted that a tendency to say the numerically smaller group was "in charge" would strengthen with age and be more likely when the ratio between the groups' numerical sizes was greater (i.e., the numerically smaller group was rarer).

Method

Participants

Participants were 128 3- to 10-year-old children (68 girls, 60 boys; M_{age} = 6.50 years; *SD* = 2.30; equal number of children within each age tested) and 199 adults (86 women, 111 men, 2 preferred not to respond; M_{age} = 35.89 years; *SD* = 12.91; range = 20–86). Two additional children were tested but not included due to experimenter error. Parents of 48% of children reported demographic information. Of those, 76% identified their child's race as White, 8% as Other, 5% as Black, 3% as Asian, 2% as Asian and White, 2% as Native American, White and Black, 2% as Native American and Latinx and White, and 2% as Biracial. Parents of 38% of participants reported family income. Of those, family income ranged from < $15,000 to > $150,000, with a median reported income of $75,000–$99,999. Children were tested in Central

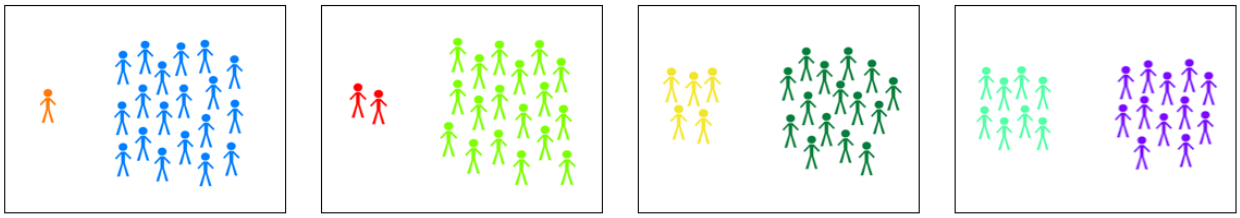
New York and recruited from a University database or children's museum. Adults were recruited from the United States via Amazon's Mechanical Turk (MTurk).

Procedure

Participants viewed 20 stick figures that were equivalent in individual size. The figures were split into two groups that differed in color and numerical size (side of numerically larger group and group color counterbalanced across participants). Between-subjects, we randomly assigned children and adults to one of four group size ratios: 1 person and 19 people; 2 people and 18 people, 5 people and 15 people, or 8 people and 12 people (see Figure 2.1). We manipulated group size ratio between subjects to avoid participants explicitly comparing ratios and thus calibrating across trials. By having participants make a single judgment and comparing across participants' responses, we aimed to get a clearer picture of the effect of ratio on judgments.

Figure 2.1

Example stimuli used across Experiments



Note. Example stimuli displayed to children and adults across group size ratios (1:19, 2:18, 5:15, 8:12). Across participants and conditions, we counterbalanced the side of the smaller group and the color of each group.

We set the smallest ratio as 2:3 (8 and 12), as used in past research with children (Pun et al., 2016) and adults (Cao & Banaji, 2016). Children viewed stimuli on a laminated piece of paper. Adults viewed identical stimuli on an online survey created using Qualtrics. Participants learned that there were two social groups. Next, we asked participants which group is "in

charge" (*Numerical Group Size Question*). We additionally asked children to explain their answer (*Explanation Question*) and recorded responses verbatim.

Coding

For the *Numerical Group Size Question*, we coded whether participants chose the numerically smaller (i.e., 1, 2, 5, or 8) or numerically larger (i.e., 19, 18, 15, or 12) group. For the *Explanation Question*, we categorized children's responses into *status-based* responses, which mentioned the group's uniqueness or distinctiveness (e.g., "Separated from the others. It stands out!"); (2) *power-based* responses, which mentioned the group's strength in numbers (e.g., "Because more people! More control, more money, more power."); and (3) *other* responses. Responses in this third category focused on the groups in a way that coders did not reliably pick out either power or status as more central. Among these responses, common themes observed were the relation between the two groups' sizes (e.g., "Each person gets a certain amount of people in the other group") and the spatial relation between the two groups (e.g., "Standing way in front and then all of them are standing in the back"). The first author and a coder unaware of the authors' hypotheses coded explanations for this and the following experiments; neither coder knew the group size ratio or children's responses to the *Numerical Group Size Question* when coding *Explanation Questions*. Agreement was 95%, and disagreements were resolved verbally. A subset of children offered uninformative explanations (n = 34; e.g., "I don't know;" "Kitty cat!;" "Just because;" "They are orange"); these explanations were split across children who chose the numerically larger and smaller groups, and were not included in analyses. Including these participants' responses does not change the pattern of results.

Results

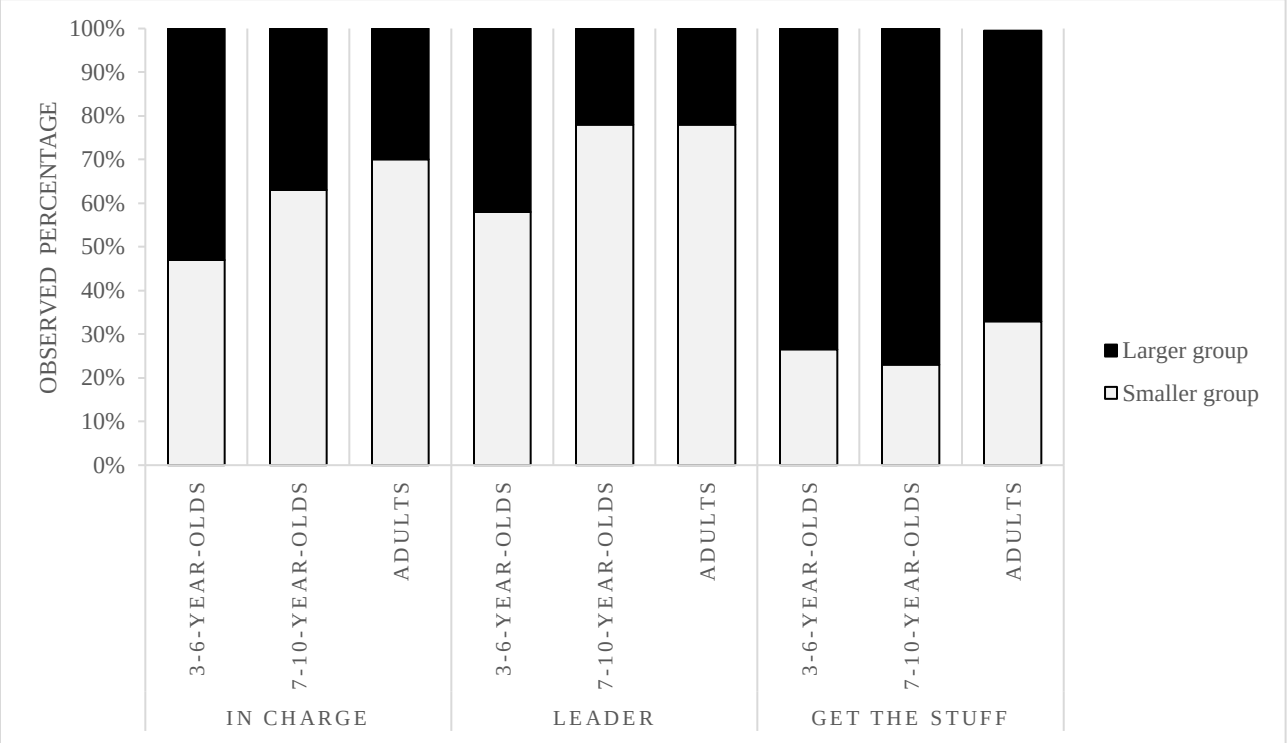
Numerical Group Size Question

Across ages, children were split between choosing the numerically smaller group and larger group as "in charge" (55% chose the numerically smaller group; not different from chance, $\chi^2(1) = 1.13$, $p = .289$, $w = .09$). The majority of adults chose the numerically smaller group as "in charge" (70%, significantly different from chance, $\chi^2(1) = 31.36$, $p < .001$, $w = .40$).

We constructed two logistic regression models (one for children and one for adults) with responses to the *Numerical Group Size Question* as the outcome and group size ratio as the predictor. For children, we additionally included participant age as a predictor. Older children were more likely than younger children to choose the numerically smaller group as "in charge" (odds ratio = 1.27, $\beta = 0.24$, 95% CI = [0.06, 0.43], $SE = 0.21$, Wald $\chi^2(1) = 6.51$, $p = .011$) (see Figure 2.2), and adults were more likely than children to choose the numerically smaller group, $\chi^2(1) = 7.76$, $p = .005$, $w = .15$.

Figure 2.2

Responses to the *Numerical Group Size Question* across Experiments



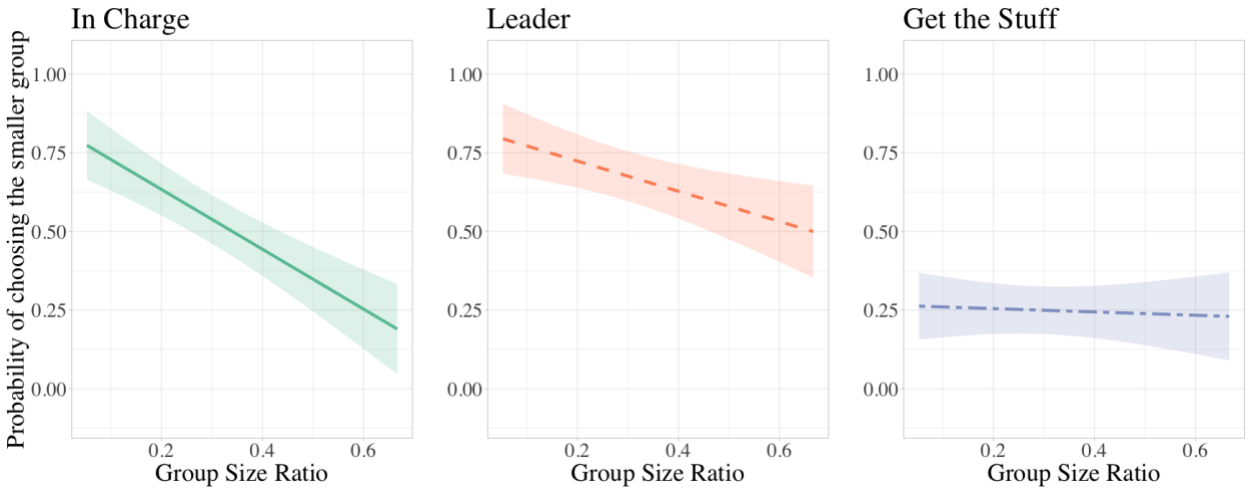
Note. The observed percentage of participants, within three age groups (3–6-year-olds, 7–10-year-olds, and adults) that chose the numerically smaller and larger group as "in charge," "the leader" and most likely to "get the stuff" across Experiments 1 to 3.

Both children's and adults' responses depended on the ratio between the groups' numerical sizes. The greater the ratio between the groups' sizes (and thus the rarer the smaller group), the more likely children (odds ratio = 0.01, β = -4.61, 95% CI = [-6.59, -2.85], *SE* = 0.95, Wald $\chi^2(1) = 23.76$, $p < .001$) and adults (odds ratio = 0.04, β = -3.20, 95% CI = [-4.55, -1.92], *SE* = 0.67, Wald $\chi^2(1) = 22.99$, $p < .001$) were to choose the numerically smaller group as "in charge" (see Figure 2.3).

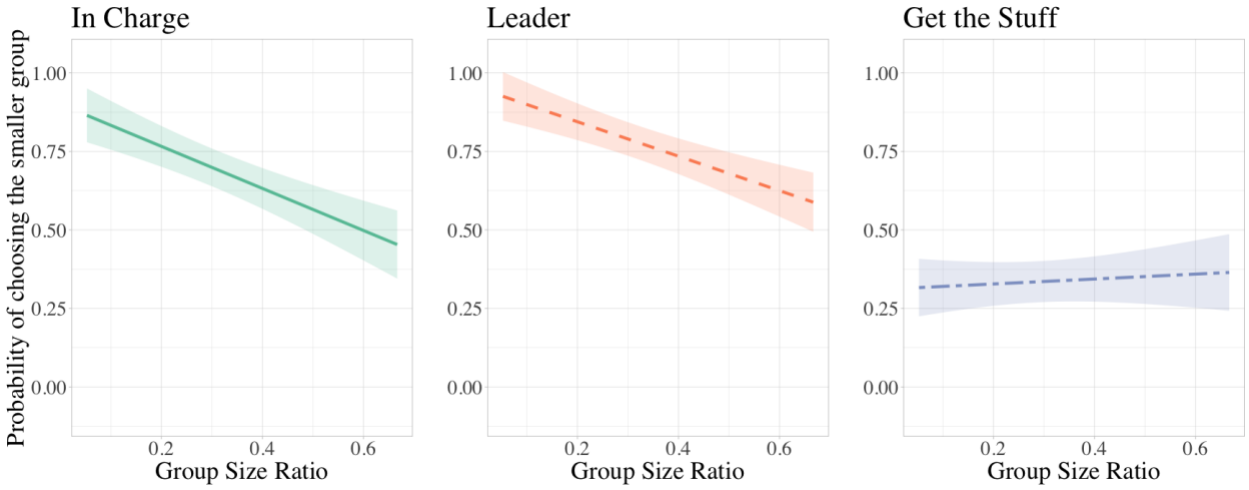
Figure 2.3

The effect of relative group size on children's and adults' responses across Experiments

Children



Adults



Note. The probability of children (top) and adults (bottom) ascribing greater social rank to the numerically smaller group as a function of the groups' relative numerical sizes, across Experiments 1 to 3. Shaded areas represent 95% Confidence Intervals.

Explanation Question

Children's explanations differed depending on the numerical size of the group they said was "in charge," Fisher's Exact Test, $p < .001$. Children who chose the numerically larger group

almost exclusively referred to the group's power (95% of those who provided informative answers did so). In contrast, children who said the numerically smaller group was "in charge" were more likely to mention the selected group's status.

Table 2.1

Children's responses to the *Explanation Question* across Experiments

Experiment	Chosen group	Power	Status	Other	Uninformative
Exp. 1 "In charge"	Smaller group (*n* = 70)	2	26	25	17
	Larger group (*n* = 58)	39	0	2	17
Exp. 2 "Leader"	Smaller group (*n* = 87)	3	41	31	12
	Larger group (*n* = 41)	19	0	7	15
Exp. 3 "Get the Stuff"	Smaller group (*n* = 32)	0	9	10	13
	Larger group (*n* = 96)	69	1	8	18

Note. The number of children whose explanations were coded as "status," "power," "other," and "uninformative," across Experiments 1 to 3 and broken down by the numerical size of the group chosen for the *Numerical Group Size Question*.

Discussion

When asked which of two social groups was "in charge," a tendency to choose the numerically smaller group strengthened with age. Given past findings that infants and young children perceive numerically larger groups as having greater power in situations of conflict (Lourenco et al., 2016; Pun et al., 2016), one possibility is that children initially think about

social rank as relating primarily to physical power (regardless of context) and more gradually consider also cases in which numerical size and social rank are inversely related.

Both children's and adults' choice of numerical group size depended on the ratio between the groups' numerical sizes. The greater the difference between the groups' sizes (i.e., the rarer the smaller group), the more likely children and adults were to say the numerically smaller group was "in charge." In contrast, when the groups were more similar in size (e.g., 8 versus 12 people), participants were more likely to perceive the numerically larger group as in charge. Different group size ratios may elicit thinking about different group contexts. Cases in which the numerically smaller group is especially rare may be particularly likely to invoke conceptions of pyramidal social hierarchies in which a limited number of individuals are conferred the highest status. In contrast, cases in which the two groups are more similar in numerical size may be more likely to elicit thinking about the groups as separate and potentially in competition.

In Experiment 2, we aimed to replicate and extend our findings. We asked children and adults which group was "the leader," a framing of status we thought would also be sensitive to relative group size and participant age and be especially likely to cue conceptions of pyramidal hierarchies, in which a numerically smaller group holds the highest social rank.

Experiment 2

We presented children and adults with the same stimuli from Experiment 1, but asked which group is "the leader." In social groups, leaders tend to represent a numerical minority that is ascribed the highest status (Magee & Galinsky, 2008). We predicted that an awareness of this relation between leadership and numerical group size would similarly strengthen with age and be sensitive to the relative numerical size of the two groups.

Method

Participants

Participants were 128 3- to 10-year-old children (63 girls and 65 boys; M_{age} = 6.50 years; *SD* = 2.30; equal number of children within each age tested) and 208 adults. One additional child was tested but not included due to a recording error. Parents of 61% of children provided demographic information. Of those, 73% identified their children as White, 15% as Other, 4% as Asian or Asian American, 3% as Black, 3% as Asian or Asian American and White, 1% as Asian or Asian American and White and Black, and 1% as Native Hawaiian. Parents of 59% of participants reported family income. Of those, family income ranged from < $15,000 to > $150,000, with a median income of $50,000–$74,999. Children were tested in Central New York and recruited from a university database or children's museum. Adults were recruited from the United States via Amazon's Mechanical Turk (MTurk).

Procedure

We presented participants with the same stimuli from Experiment 1 and asked which group was "the leader" (*Numerical Group Size Question*). We again asked children to explain their answers (*Explanation Question*) and recorded their responses verbatim.

Coding

We coded responses in the same way as in Experiment 1. Agreement for the *Explanation Question* was 98% and disagreements were resolved verbally. We again excluded cases in which children's explanations were uninformative (e.g., "I don't know," "Just because"; *n* = 27). These instances were split evenly across children who chose the numerically larger and smaller group and including these explanations does not change the pattern of results.

Results

Numerical Group Size Question

Overall, 68% of children and 78% of adults chose the numerically smaller group as "the leader" (both different from chance; children: χ^2 =16.53, $p < .001$, $w = .36$; adults: $\chi^2 = 66.94$, $p < .001$, $w = .57$). We constructed two logistic regression models (one for children and one for adults), with responses to the *Numerical Group Size Question* as the outcome and group size ratio as the predictor. For children, we additionally included age as a predictor.

Children's responses changed with age. Older children were more likely than younger children to choose the numerically smaller group (odds ratio = 1.25, $\beta = 0.22$, 95% CI = [0.05, 0.41], $SE = 0.09$, Wald $\chi^2(1) = 6.09$, $p = .014$). Likewise, adults were more likely than children to choose the numerically smaller group, $\chi^2(1) = 4.00$, $p = .046$, $w = .11$, a difference that is driven by the younger children in the sample (see Figure 2.2).

The greater the ratio between the groups' sizes, the more likely children (odds ratio = 0.100, $\beta = -0.63$, 95% CI = [-3.95, -0.71], $SE = 0.82$, Wald $\chi^2(1) = 7.85$, $p = .001$) and adults (odds ratio = 0.04, $\beta = -3.23$, 95% CI = [-4.69, -1.84], $SE = 0.72$, Wald $\chi^2(1) = 19.92$, $p < .001$) were to choose the numerically smaller group as "the leader" (see Figure 2.3).

"In Charge" versus "Leader"

As detailed above, the overall patterns for "in charge" and "leader" were very similar: In both cases, an association between the numerically smaller group and social rank strengthened with age, and when the numerically smaller group was rarer. However, the overall rates of selecting the numerically smaller group also differed across the two experiments. Both children and adults were descriptively more likely to choose the numerically smaller group as "the leader" than as "in charge," though this pattern was significant only among children's responses (Children: $\chi^2(1) = 4.76$, $p = .029$, $w = .14$; Adults: $\chi^2(1) = 3.41$, $p = .065$, $w = .09$).

Explanation Question

Children's explanations differed depending on the numerical size of the group they chose, Fisher's Exact Test, $p < .001$. Children who chose the numerically smaller group were more likely to employ status-based explanations, whereas children who chose the numerically larger group were more likely to employ power-based explanations (Table 2.1).

Discussion

In Experiment 2, we replicated our central findings from Experiment 1 using a different framing of social hierarchy. Participants' reasoning again shifted with age; older children and adults were more likely than younger children to say the numerically smaller group was the leader. This finding provides converging evidence that children's early conceptions of social hierarchy may be rooted in reasoning about physical power (regardless of context), and then later incorporate an awareness of hierarchies in which status tends to be associated with numerically smaller groups. Children's and adults' responses also depended on the ratio between the groups' sizes. The rarer the smaller group (i.e., the greater the difference between groups' numerical sizes), the more likely participants were to choose the numerically smaller group as "the leader."

Despite the similarities between the results from Experiments 1 and 2, children's responses did differ between "leader" and "in charge." Children were more likely to choose the numerically smaller group when asked which group was "the leader" than when asked which group was "in charge." Likewise, the difference between children's and adults' reasoning was more pronounced when asked which group was "in charge" compared to which group was "the leader." The present results suggest that "in charge" may be relatively more likely to invoke conceptions of intergroup power. This difference in framings raises questions about how similar framing manipulations may impact children's and adults' judgments across a variety of scenarios. For example, framing a high-status position as one in which someone is "the leader"

versus “in charge” (as well as other framings) may result in different expectations about the skills involved, or about the kind of person or group that would best fit this position.

Taken together, the results from Experiments 1 and 2 suggest an association between numerically smaller groups and status strengthens with age and depends on the ratio between groups’ numerical sizes. These findings leave open questions regarding whether children’s and adults’ reasoning about situations eliciting considerations of power-based hierarchies are similarly sensitive to age and group size ratio, or may be more consistent. In Experiment 3, we framed the two groups as being in competition over resources and asked which group would prevail.

Experiment 3

We showed participants the same stimuli, but framed the situation as a competition over resources. We told children and adults that both groups wanted the “stuff” in their town, which we used as a neutral and child-friendly term to describe the town’s resources. We then asked participants which group they thought would get the “stuff.” In contrast to the prior two experiments, we predicted that an association between the numerically larger group and power would be consistent across ages. Even infants and preschoolers expect members of numerically larger groups to hold greater social dominance (Lourenco et al., 2016; Pun et al., 2016) and adults associate greater physical dominance with numerically larger groups (Cao & Banaji, 2016). Second, we predicted that the ratio between groups’ sizes would matter less for judgments of which group would prevail in a resource competition. Although relative group size may inform judgments of how *likely* a group is to prevail, children and adults may be equally likely to choose the numerically larger group in a forced-choice context.

Method

Participants

Participants were 128 3- to 10-year-old children (65 girls and 63 boys; M_{age} = 7.18 years; *SD* = 2.29; equal number of children within each age group tested) and 203 adults (M_{age} = 35.20 years; *SD* = 12.49; range = 19–80). Three additional children were tested but not included due to experimenter error; failure to finish the study; and parental interference. Parents of 67% of participants provided demographic information. Of those, 71% identified their children as White, 8% as Other, 7% as Asian or Asian American, 3% as Hispanic or Latinx, 2% as Biracial, 2% as Native Hawaiian, 2% Asian or Asian American and White and Hispanic or Latinx, 2% as Native American and White, 1% as Black, 1% as Asian or Asian American and White, and 1% as Black and White. Parents of 66% of children reported family income. Of those, reported income ranged from $20,000 to > $150,000, with a median income of $75,000–$99,000. Children were tested in Central New York, and recruited from a university database or children's museum. Adults were recruited from the United States via Amazon's Mechanical Turk (MTurk).

Procedure

The stimuli and procedure were identical to the prior two experiments. Participants heard that both groups wanted the "stuff" (i.e., a child-friendly and neutral term to connote resources) in their town. Participants were asked to indicate which group they thought would "get the stuff" (*Numerical Group Size Question*). We again asked children to explain their answers (*Explanation Question*) and recorded their responses verbatim. We additionally asked adults to explain their answers, as an exploratory measure.

Coding

We coded responses in the same way as in the prior experiments. Agreement was 94% and disagreements were resolved verbally. We excluded cases in which children's explanations

were uninformative (e.g., “I don’t know,” “Just because”; n = 31). These cases were split evenly across children who chose the numerically larger and smaller group, and including these participants does not change the pattern of results.

Results

Numerical Group Size Question

The majority of children and adults said the numerically larger group would “get the stuff” (75% of children and 67% of adults, both different from chance, children: χ^2 =32.00, p < .001, w = .50; adults: χ^2 = 22.11, p < .001, w = .33). We constructed two logistic regression models (one for children and one for adults) with participants’ responses to the *Numerical Group Size Question* as the outcome and group size ratio as the predictor. For children, we additionally included participant age as a predictor.

Children’s choices did not change with age (odds ratio = 0.93, β = -0.07, 95% CI = [-0.25, 0.11], SE = 0.09, Wald $\chi^2(1)$ = 0.55, p = .46 (see Figure 2.2). Adults were more likely than children to choose the numerically smaller group, but not significantly so, $\chi^2(1)$ = 2.99, p = .08, w = .10.

The ratio between the groups’ sizes did not predict children’s (odds ratio = 0.75, β = -0.28, 95% CI = [-0.29, 0.43], SE = 0.86, Wald $\chi^2(1)$ = 0.11, p = .74) or adults’ (odds ratio = 1.42, β = 0.35, 95% CI = [-0.87, 1.55], SE = 0.61, Wald $\chi^2(1)$ = 0.32, p = .57) responses (see Figure 2.3).

“Get the Stuff” versus “In Charge” and “Leader”

Both children and adults were more likely to choose the numerically smaller group when asked which group is “in charge” (children: $\chi^2(1)$ = 25.53, p < .001, w = .30; adults: $\chi^2(1)$ =

53.16, $p < .001$, $w = .36$) and "the leader" (children: $\chi^2(1) = 47.50$, $p < .001$, $w = .43$; adults: $\chi^2(1) = 84.02$, $p < .001$, $w = .45$) compared to when asked which group would get "the stuff."

Explanation Question

As in the first two studies, children's explanations differed depending on whether they said the numerically larger or smaller group would "get the stuff," Fisher's Exact Test, $p < .001$. Children who chose the numerically larger group tended to employ power-based explanations. In contrast, children who chose the numerically smaller group were more likely to employ status-based and "other" explanations (Table 2.1), though note that dramatically fewer children selected the numerically smaller group compared to in the other two studies.

Discussion

When presented with two groups in conflict over resources, both children and adults perceived the numerically larger group as more likely to get those resources. This tendency did not change with age, nor did it depend on the ratio between the two groups' numerical sizes.

The observation that children's reasoning did not shift with age suggests reasoning about power—unlike reasoning about status—may emerge early and remain relatively consistent across development. However, it is worth noting that adults were descriptively *less* likely than children to choose the numerically larger group. Adults, relative to children, may be more aware of world contexts in which certain kinds of resources (e.g., money) are distributed unequally, such that a numerically smaller group of individuals holds a disproportionate number of resources relative to their numerical size. In Experiment 3, we included an exploratory open response section to begin to examine adults' intuitions about this framing. Adults who chose the numerically smaller group often mentioned wealth or power inequality (e.g., "Generally in our society, wealth is focused on the individual instead of the masses," "I assumed the 1% would get

the stuff," and "My experience with the world shows that a minority represses the majority." For similar findings, see: Cao & Banaji, 2016). Open questions concern how, when in life, and through what experiences an association between numerically smaller groups and resource control develops.

General Discussion

Across three studies, we investigated the perceived relation between numerical group size and social hierarchy, and what factors may influence reasoning about this relation. Our results demonstrate that the perceived relation between social group size and hierarchy is flexible, depending on whether participants reasoned about power or status. Mirroring existing research (Cao & Banaji, 2016; Lourenco et al., 2016; Pietraszewski & Shaw, 2015; Pun et al., 2016), children and adults associated greater control over resources with numerically larger groups. This pattern was relatively consistent; it did not change across development, nor did it depend on how *much* larger the numerically larger group was.

In contrast, when asked which group was "in charge" or "the leader," children's and adults' reasoning was more flexible: A perception of which group held greater social rank changed across development and depended on the ratio between the groups' numerical sizes. Specifically, children and adults were more likely to perceive the numerically larger group as higher in social rank when the two groups were more similar in numerical size; thus, reasoning more similarly to when asked which group would prevail in a conflict over resources. However, when the ratio between groups' numerical sizes was greater (the numerically smaller group was rarer), children and adults overwhelmingly chose the numerically smaller group.

Open questions regard why the ratio between groups' sizes shifted the perceived relation between numerical group size and hierarchy. Oftentimes, status and prestige are conferred to

only a subset of individuals, such that numerical group size is inversely correlated with social rank. As such, cases in which the numerically smaller group was especially rare may have been particularly likely to elicit reasoning about pyramidal social hierarchies. Indeed, given that status and prestige tend to depend on other people's (i.e., followers) respect or deference (Magee & Galinsky, 2008; Price & Van Vugt, 2014), a greater ratio between the groups may have signaled that there are more followers to each leader, thus increasing perceptions of the numerically smaller group's status. A complementary possibility is that groups that are more similar in size (e.g., 8 versus 12 people) may seem more like separate groups, that are potentially in competition. Existing research suggests the presence of intergroup competition leads children to categorize novel (Rhodes & Brickman, 2011) and real-world (Ferera et al., 2018) social groups as more different from one another. The present results hint that the reverse may also be true: When people think two groups are different from one another, they may be more likely to think the groups are in competition. Open questions concern how the ratio between groups' numerical sizes shifts participants' likelihood of reasoning about intergroup versus intragroup relations.

Whereas reasoning about group-based power was relatively consistent across the ages tested, an association between numerically smaller groups and status strengthened with age. Put another way, whereas older children and adults responded quite differently to the framings used across the three studies, younger children were more likely to associate the numerically larger group with greater social rank irrespective of framing. This finding suggests the developmental trajectories of reasoning about power and status may differ. Reasoning about power may emerge early and remain relatively consistent across development, whereas reasoning about status—and associated pyramidal hierarchies—may develop more gradually.

Open questions concern what inputs shape a developing association between numerically smaller groups and status. One possibility involves the development of children's reasoning about others' internal states, which undergoes considerable development during the preschool years (Flavell et al., 1995; Wellman et al., 2001; Wimmer & Perner, 1983). Reasoning about power may be more concrete, in that it is often based in physical interactions or represented visibly (e.g., which group will push the other over or which individual is bigger or taller). In contrast, reasoning about status may involve representing more abstract social relations and concepts (e.g., knowledge, competence, admiration, respect, etc.). For these reasons, thinking about a group's ability to exert physical dominance over another may be developmentally easier than thinking about group relations that are less tangible.

A complementary possibility is that an association between numerically smaller groups and status is learned from real-world cases in which numerically smaller groups hold greater status. For example, children may notice that a small number of teachers is often "in charge" over a larger number of students. More generally, children may over time notice that many social hierarchies in the world are pyramidal, such that greater social rank is inversely related to numerical group size. Relatedly, another developmental shift emerged in adults' inferences about resource control in Experiment 3. Although both children and adults tended to predict that a numerically larger group would prevail in a resource competition, adults were more likely than children to say that the numerically smaller group would prevail. Adults who responded in this way often cited real-world patterns of wealth inequality as their reasoning ("Generally in our society, wealth is focused on the individual instead of the masses"). Cao & Banaji (2016) documented a notably similar pattern: Although adults implicitly associated numerically larger groups with physical dominance, adults were more split between choosing the numerically larger

and smaller groups when asked explicitly which group was more physically dominant (Cao & Banaji, 2016).

The documented developmental change in children's reasoning resembles developmental changes in children's understandings of benevolent and malevolent forms of social rank held by individuals. Compared to an understanding of malevolent power, children's understanding of benevolent power shows a protracted development. For example, Hawley (1999) proposed that children use both coercive and prosocial power strategies, but showed that prosocial strategies emerge later than coercive ones. Similarly, Gülgöz & Gelman (2017) contrasted children's recognition of individuals who hold malevolent and benevolent power, and found that understandings of the two follow different developmental trajectories; whereas preschoolers easily recognized malevolent forms of power, children's understanding of benevolent forms of power developed substantially over ages 3 to 9 (Gülgöz & Gelman, 2017). Given similarities between this developmental shift and that in the present studies, reasoning about benevolent power may align more closely with thinking about status. Future work may explore how children's understanding of the valence (i.e., malevolent versus benevolent) of power relates to and informs different notions of hierarchy (e.g., status, power).

The present results raise open questions about how the relation between numerical group size and hierarchy operates across contexts beyond those tested here. If an association between numerically smaller groups and status is shaped by experiences and observations of the world, then reasoning about the relation between numerical group size and hierarchy is likely to vary across cultures and contexts (e.g., contexts in which resources (e.g., wealth) are distributed more or less evenly; contexts in which the importance of power and status vary). Supporting this notion, recent research suggests children's emerging conceptions of status and power vary cross-

culturally (Charafeddine et al., 2019; Fonn et al., 2020; Kajanus et al., 2020). For example, although children in France identify more with a dominant agent and prefer this agent's testimony, children in Japan show no preference between a dominant agent and a subordinate, and prefer testimony from the subordinate (Charafeddine et al., 2019). The present findings are limited in that they test children from one location in the United States and who thus are exposed to similar mappings between numerical group size and hierarchy in their local environment. Future research could compare children's reasoning about numerical group size and hierarchy across contexts in which mappings between numerical group size and hierarchy vary. For example, children raised in societies in which the numerical minority group is historically the most powerful or in which there is greater wealth inequality might show a stronger or earlier-emerging association between numerically smaller groups and social rank.

Moreover, we presented participants with stripped-down stimuli and contexts to examine the perceived relation between numerical group size and social status in the absence of other features of social groups. Outside of the lab, people rarely consider a group's size devoid from other group features. Open questions involve how and whether people incorporate numerical group size into their judgments if also presented with groups that differ in gender or racial composition or in the language they speak (to provide just a few examples). Other questions concern how people reason about numerical group size when the framing is more complex. Here, we used different framings of social rank across experiments (i.e., "in charge," "the leader," most likely to get the town's resources), but we did not further specify the context in which this hierarchy existed. Reasoning may differ depending on *whom* the group is leading, *what* the group is in charge of, or what *kind* of resources the group is controlling. Moreover, in the world, group-based power and status tend not to be separable. For example, members of social groups that

hold power often also hold higher status in other contexts. Indeed, group-based social power reinforces group members' status by providing them with greater access to resources (e.g., education, wealth). Open questions concern when and how children use information about group-based power to predict who is likely to hold the highest status in other contexts (e.g., to be the "leader" or to be "in charge").

In the present study, the groups' sizes were static, but in the world, social group size is dynamic. Interesting and timely questions concern situations in which social groups' numerical sizes change. Recent research suggests changes in social groups' relative numerical sizes hold consequences for people's social thinking (Craig et al., 2018; Craig & Richeson, 2014). For instance, priming participants to consider a "majority-minority" America—a term meaning that racial and ethnic groups that have been historically underrepresented in the U.S. will comprise the majority of the country's population—led White Americans to express more conservative political views (Craig & Richeson, 2014). When groups' relative numerical sizes are particularly salient, a better understanding of the basic mechanisms underlying the developmental roots of reasoning about social group size and social hierarchy may be particularly informative.

In conclusion, the present work highlights the importance of considering numerical group size as a meaningful feature of social groups. We find that the perceived relation between numerical group size and social hierarchy is flexible depending on whether the context elicits reasoning about power or status. An association between numerically smaller groups and status strengthens with age and depends on the ratio between groups' numerical sizes. These findings expand an understanding of how perceptions of numerical group size—an ever-present feature of social groups—inform expectations of social hierarchy across development.

Part III: Developmental roots of preferences for dominant and prestigious leaders during times of competition and cooperation

Imagine two potential leaders: One is experienced and skilled; people view them as respected. The other is assertive and strong; people view them as powerful. Who would you choose? Perhaps unsurprisingly, when given a similar choice, people, and groups of people (e.g., political parties), vary in the choices they make, but a fascinating finding with adults is as follows: Individual people do not always make the same choice. Instead, what people look for in leaders fluctuates across contexts and circumstances, such that people are especially likely to look for strong, dominant leaders during times of actual, and even *perceived*, competition, threat, and uncertainty (Andrews-Fearon & Davidai, 2023; Garfield et al., 2020; Kakkar & Sivanathan, 2017; Laustsen & Petersen, 2017; Little et al., 2007; Nettle & Saxe, 2021; Re et al., 2013; Ronay et al., 2020; Sprong et al., 2019). For instance, in one study, within minutes, the same people that valued strong, tough leaders *less* when reading about a town facing resource abundance or peace valued strong, tough leaders *more* when reading about a town facing scarcity or war (Nettle & Saxe, 2021). These experimental patterns are mirrored in the real world: In an analysis of 52 countries spanning the globe, perceived threat of war and inequality predicted both between- and within-country variation in preferences for dominant leaders (Nettle & Saxe, 2021; for similar results, see: Kakkar & Sivanathan, 2017; Sprong et al., 2019).

Here, we investigated the developmental roots of preferences for dominant vs. prestigious leaders during times of cooperation and zero-sum competition. Although leadership and decision-making can seem distant from young children's lives, children's thinking about leadership offers a fresh perspective into the foundations on which sociopolitical thought forms, as well as into why certain preferences and ways of thinking about leadership may remain particularly intuitive across the lifespan and over time (see Heck, Santhanagopalan et al., 2021a; Reifen-Tagar & Cimpian, 2022). We predicted that contextual variation in leader preferences

may have roots in patterns of thinking that emerge early in life, such that young children value prestige during times of cooperation and peace, but are more likely to look for dominance during times of conflict and competition.

Prior research reveals that children begin forming ideas about what it means to be a leader early in life (Enright et al., 2020; Gülgöz & Gelman, 2017; Heck, Kushnir, et al., 2021; Laupa, 1994; Stavans & Baillargeon, 2019; Stavans & Diesendruck, 2021; Thomas et al., 2022; Yau et al., 2009). For example, young children can use a range of cues to identify who is "in charge" (Brey & Shutts, 2015; Enright et al., 2020; Gülgöz & Gelman, 2017; Heck, Kushnir, et al., 2021; Over & Carpenter, 2015; Terrizzi et al., 2019), and children hold expectations about how leaders will behave, including that leaders will rectify ingroup transgressions (Stavans & Baillargeon, 2019) and oust outgroup intruders (Thomas et al., 2022).

Young children also appear to understand that leadership can take different forms (Amakusa et al., 2022; N. Cheng et al., 2021; Gülgöz & Gelman, 2017; Kajanus et al., 2020; Margoni et al., 2018, 2022). By at least 21 months of age, children distinguish between leaders who acquire rank through force vs. respect (i.e., dominance vs. prestige; Margoni et al., 2018), and a distinction between dominance and prestige continues to widen over the early childhood years (N. Cheng et al., 2021; Kajanus et al., 2020). By the early school years, children say others will approach prestigious individuals and fear dominant ones (Kajanus et al., 2020), and children place greater trust in prestigious (vs. dominant) individuals (Margoni et al., 2022). Further evidence that children hold dual representations of leadership comes from recent studies on children's thinking about the relation between leadership and helping: Whereas some research finds that children view helping as an important aspect of leadership (Stavans & Diesendruck, 2021), other research finds that children associate being "in charge" with *not* helping others

(Terrizzi et al., 2020; Thomas et al., 2022). One possibility is that these discrepant findings reflect children bringing to mind prestige- vs. dominance-based leadership, respectively.

We predicted that beyond differentiating between dominance and prestige, young children may differentially *value* dominant and prestigious leaders in different contexts. Specifically, we predicted that children would prioritize dominance during times of competition and prestige during times of cooperation. Broadly, children are sensitive to cues to competition vs. cooperation as early as infancy (Ferera et al., 2018; Pun et al., 2021), and these cues inform children's social cognition across a range of contexts (Domberg et al., 2018; Ferera et al., 2018; McGuire et al., 2018; McGuire, Rizzo, et al., 2019; Pun et al., 2021; Rhodes & Brickman, 2011; Warneken et al., 2011). As such, we predicted that children would be capable of incorporating cues to competition and cooperation into their leadership cognition beginning early in life.

The possibility that contextual effects on leadership preferences have early-life roots is further supported by the existing literature on these effects. Evolutionary psychologists have argued that both a distinction between dominance and prestige—as well as a tendency to look for strong, dominant leaders during times of conflict—are rooted in our species' evolutionary past (J. T. Cheng et al., 2013; Henrich & Gil-White, 2001; Murray, 2014; Van Vugt & Smith, 2019); and there is further evidence that both styles of leadership exist, and emerge in different contexts, among non-human animals (Mandalaywala, 2022; Smith et al., 2016; Van Vugt & Smith, 2019). In sum, we predicted that when shown a context involving competition (vs. cooperation), children, mirroring adults (Kakkar & Sivanathan, 2017; Little et al., 2007; Nettle & Saxe, 2021; Ronay et al., 2020; Sprong et al., 2019), would show stronger preferences for dominant leaders, and that effects of context on leadership preferences would be present early in life.

A developmental approach further affords the exciting opportunity to examine age-related changes and the emergence of potential individual differences across children's own local contexts. Indeed, because young children's contexts and experiences are more limited than those of their adult counterparts, a developmental angle provides an especially valuable lens into the roles of early-life contexts and experiences in shaping people's sociopolitical views. Regarding developmental change, we predicted that children would start out preferring more dominant leaders, but that a preference for prestigious leaders would strengthen over early childhood. Whereas reasoning about power, dominance, and physical force appears to emerge early and remain relatively stable over development, representations of leadership that are less rooted in physical power seem to develop more gradually (Heck et al., 2022; Bas & Sebastian-Galles, 2021; Thomsen, 2020; Hawley, 1999; see also Gülgöz & Gelman, 2017 for a similar pattern in children's thinking about malevolent vs. benevolent power).

As children grow, what children look for in leaders is likely also tuned by their own sociopolitical contexts and emerging worldviews. Although a given context can be objectively characterized as involving greater competition or cooperation, these features of contexts are also *subjectively* perceived: People vary in the extent to which they view the world as a naturally competitive and hierarchical place (see social dominance orientation, authoritarian values; e.g., Altemeyer, 1998; Feldman & Stenner, 1997; Ho et al., 2012; Reifen-Tagar & Cimpian, 2022; Stenner, 2005), and the more competitive and hierarchical people *perceive* the world to be, the more people tend to prefer strong, dominant leaders (Andrews-Fearon & Davidai, 2023; Cohen & Smith, 2016; Laustsen & Petersen, 2020). Here, we began exploring the possibility that young children's leadership preferences—independent of the contexts we showed—may begin reflecting children's own local sociopolitical contexts. Specifically, in an analysis including all

children across the present studies, we examined whether children's leader choices might relate to their parents' political ideologies, given that political conservatism tends to correlate with higher social dominance orientation (e.g., Ho et al., 2012), authoritarian values (e.g., Nilsson & Jost, 2020), and stronger preferences for dominant leaders (Kakkar & Sivanathan, 2017; Laustsen & Petersen, 2020; Sprong et al., 2019).

In the present studies, we introduced 3- to 6-year-old children (total $N = 288$; from 36 U.S. states; with racial and socioeconomic diversity) to a fictional group (the Dotis) facing a problem (a water shortage) and varied the way the problem was framed. In Experiment 1, we framed the problem as involving either between-group competition—telling children that, to get more water, the Dotis need to compete against another group—or within-group cooperation—telling children that, to get more water, the Dotis need to work together as a group. We started with these framings as especially clear-cut cases of competition and cooperation (i.e., contexts that roughly resemble times of war vs. peace). In Experiment 2, we changed the framings to always involve another group (i.e., between-group competition vs. between-group cooperation). In Experiment 3, we then extended our investigation to more indirect framings of competition and cooperation: the relative scarcity vs. abundance of resources.

In all experiments, children next learned that the Dotis were choosing a new leader and that there were two possible leaders: The "biggest and strongest" Doti that is "seen as being powerful (dominant leader); and the "most skilled and smartest" Doti that is "seen as being respected" (prestigious leader). We asked children which Doti (dominant, prestigious) would be the leader at that time. Across experiments, we predicted that children's leader choices would be sensitive to the context in which the leader was being chosen. Specifically, we predicted that children would prioritize dominance during times of competition and prestige during times of

cooperation. Independent of context, we predicted that children would flip from a preference for dominant leaders to a preference for prestigious leaders over the early childhood years. We pre-registered these predictions in addition to the design and analyses for each experiment (Experiment 1: https://osf.io/s54nd/?view_only=6996d32dc7624d25a832380e015d6220; Experiment 2: https://osf.io/539jf/?view_only=244b2ce58ea0492cb7e3ac7f3d7d6eaa; Experiment 3: https://osf.io/swmt9/?view_only=06d66730f479449b9aaae49f12c9508f).

Experiment 1

Children learned about a fictional group (the Dotis) facing a problem. Between-subjects, we framed this problem as involving either between-group competition ("The Dotis need to compete against another group to get more water") or within-group cooperation ("The Dotis need to work together as a group to get more water"). After, children heard that the Dotis were choosing a new leader and that there were two potential leaders: One that is big, strong, and powerful (dominant) and another that is skilled, smart, and respected (prestigious). We asked children which Doti would be the leader in addition to two open response questions. We predicted that when we framed the group's problem as involving between-group competition, children would be more likely to choose the dominant leader and that when we framed the group's problem as involving within-group cooperation, children would be more likely to choose the prestigious leader. Further, we predicted that, across contexts, the older children were, the more likely they would be to choose the prestigious leader.

Methods

Participants

Participants included 96 3- to 6-year-old children (48 girls, 48 boys; M_{age} = 59.89 months; *SD* = 13.19), with an equal number of children within each age tested. This pre-registered sample

size (here, and in the following two experiments) was based on power analyses (with medium to large effect sizes and ≥ 80% power) conducted using R's "pwr" package (Champely, 2020). We randomly assigned children to one of two between-subjects conditions: *between-group competition* (n = 48; M_{age} = 59.58 months; SD = 12.18) or *within-group cooperation* (n = 48; M_{age} = 60.19 months; SD = 14.26). Participants were recruited through a university database or online advertisement and tested virtually via Zoom. Children lived in nine U.S. states, with 68% of participants living in Illinois and 20% in New York.

We asked children's parents (95% mothers; 5% fathers) to report child and family demographic information. Ninety-six percent of parents reported children's race/ethnicity, of whom, 52.2% identified their children as White; 17.4% as Biracial or Multiracial; 14.1% as Black or African American; 7.6% as Hispanic or Latin(o/a/e); 7.6% as Asian or Asian American; and 1.1% as Other. Ninety-seven percent of parents reported family income, among whom annual income ranged from $15,000–$19,999 to greater than $150,000, with a median income of $100,000–$149,999. Eighty-eight percent of parents reported their political orientation on a 7-point scale from "extremely conservative" (1) to "extremely liberal" (7) with a mid-point of "moderate/middle of the road" (4) (5% of parents provided no information; 7% said they "hadn't thought about it or didn't know"). Among parents who placed themselves on this scale, the average response was 5.19 (SD = 1.42; 65% of parents identified on the liberal side of the scale; 19% as moderate; and 15% on the conservative side of the scale).

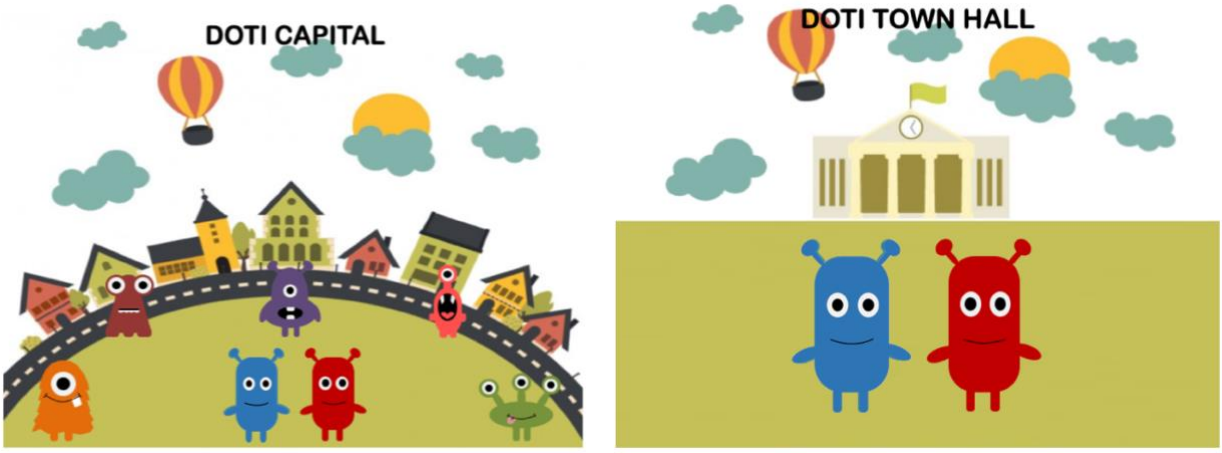
Procedure

Stimuli were presented in Qualtrics and displayed to children using Zoom's screen-sharing feature. An experimenter introduced children to a fictional town, Dotiville, where the Dotis live (see Figure 3.1). Next, children learned that the Dotis have a problem: There isn't

enough water in Dotiville. Between conditions, we framed the solution to the Dotis' problem as involving either *between-group competition* or *within-group cooperation*. Children in the *between-group competition* condition heard that the Dotis have to "compete against another group to get more water." Children in *within-group cooperation* condition heard that the Dotis have to "work together as a group to get more water."

Figure 3.1

Stimuli presented across Experiments



Note. Dotiville (left) and the two potential leaders (right). Side and colors of the *powerful* and *prestigious* leaders were counterbalanced across participants.

Next, children in both conditions learned that the Dotis were choosing a new leader. Children heard about two potential leaders, one whom we described as "the biggest and strongest Doti" who "other Dotis see as powerful" (*dominant* leader) and the other whom we described as "the most skilled and smarted Doti" who "other Dotis see as respected" (*prestigious* leader). Across participants, we counterbalanced the order in which the two leaders were introduced and the color (red or blue) of each leader. We asked children which Doti (*dominant* or *prestigious*) they thought would be the leader at this time (*Leader Question*). We additionally asked children to explain their response (*Explanation Question*). Last, referring to the leader children chose, we

asked children: “What do you think will happen next in Dotiville? What will that Doti do?” (*Solution Question*).

Results

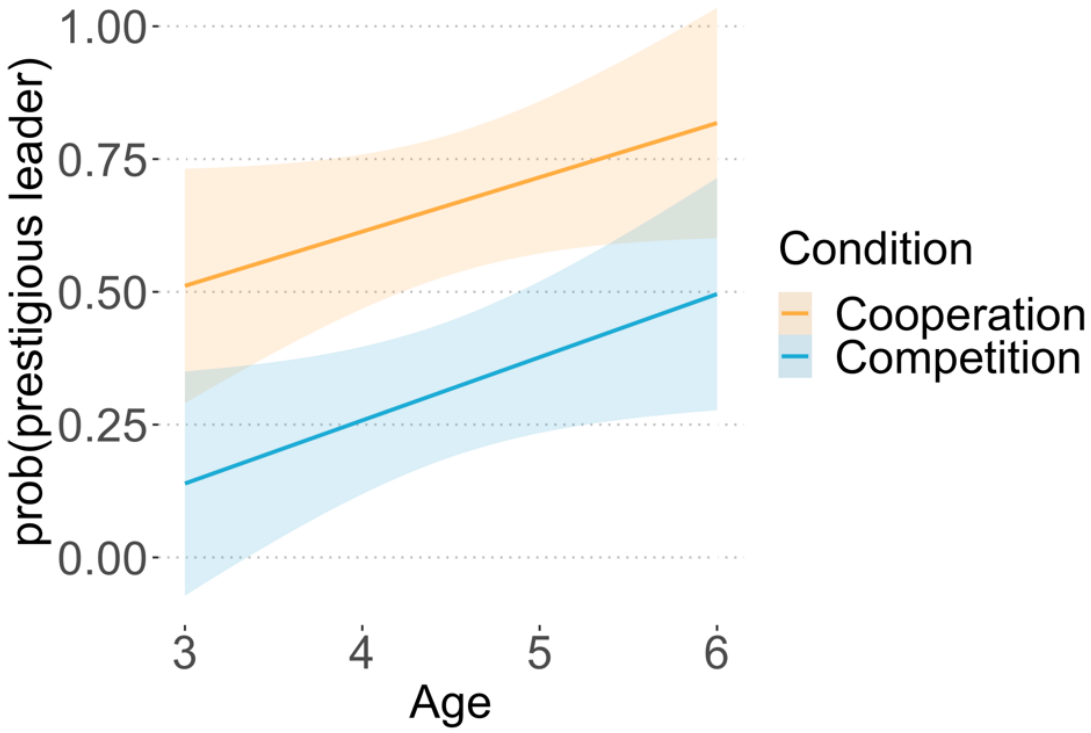
Overall, children were split between choosing the *dominant* and *prestigious* leaders (51% of children chose the *dominant* leader; not different from chance, $\chi^2(1) = 0.04$, $p = .838$, Cramer’s $V = .02$). To examine whether children’s choice of leader varied by condition (*between-group competition* vs. *within-group cooperation*) or changed with age, we constructed a logistic regression model with children’s choice of leader as the outcome and condition and participant age (in months) as predictors (additionally examining these factors’ interaction).

There was a main effect of condition: Children prioritized dominance when we framed the town’s problem as involving *between-group competition* and prestige when we framed the town’s problem as involving *within-group cooperation* (OR = 4.96, $\beta = 1.60$, 95% CI = [0.71, 2.55], $SE = 0.47$, Wald $\chi^2(1) = 11.78$, $p < .001$; see Figure 3.2). Indeed, when children heard that the Dotis had to “compete against another group,” children chose the *dominant* leader above levels expected by chance ($\chi^2(1) = 6.75$, $p = .009$, $V = .38$), and when children heard that the Dotis had to “work together as a group,” children chose the *prestigious* leader above levels expected by chance ($\chi^2(1) = 5.33$, $p = .021$, $V = .33$).

Independent of condition, there was a main effect of children’s age: Across ages 3 to 6, children were increasingly likely to choose the *prestigious* leader (OR = 1.05, $\beta = 0.05$, 95% CI = [0.02, 0.09], $SE = 0.02$, Wald $\chi^2(1) = 7.50$, $p = .006$; see Figure 3.2).

Figure 3.2

Effects of condition and participant age on responses to the *Leader Question* in Experiment 1



Note. Children's likelihood of choosing the *prestigious* leader in Experiment 1, by condition (orange: *within-group cooperation*; blue: *between-group competition*) and participant age.

These condition and age effects did not interact (likelihood ratio test: $\chi^2(1) = 0.26$, $p = .607$, $V = .05$); in other words, the effect of age was present in both conditions, and the effect of condition was consistent across ages 3 to 6. Logistic regression models revealed no significant effects of participant gender ($\chi^2(1) = 0.04$, $p = .838$, $V = .02$); side of the *prestigious* leader (i.e., left vs. right; $\chi^2(1) = 0.05$, $p = .831$, $V = .02$); or the color of each leader (i.e., red vs. blue; $\chi^2(1) = 0.67$, $p = .412$, $V = .08$) on children's responses.

Open response data

Explanation question. Here, and in the following experiments, we categorized children's explanations as: (1) *Uninformative/Irrelevant* (e.g., "Because I said so!" or "Because

it is red") (23%); (2) repeating a *Trait* of the chosen leader (e.g., "Because he is powerful and strong") (45%); (3) making a direct *Comparison* between the leaders (e.g., "They respect him more, so I think more of the people would want him to be it") (14%); or (4) commenting on a particular *Function* of the chosen leader (e.g., "You have to be strong to keep the peace") (19%). Multinomial logistic regression models revealed that children's explanations changed with age (likelihood ratio test: $\chi^2(3) = 38.50$, $p < .001$, $V = .37$) but did not depend on condition ($p = .351$) or children's choice of leader ($p = .327$). With age, children provided fewer *Uninformative* explanations ($p = .007$) and more *Function* explanations ($p = .004$).

Solution question. In coding children's responses to the *Solution Question*, we drew inspiration from Smith et al. (2016)'s review of leadership in mammalian societies, in which they identified four domains of leadership: (1) collective movement (knowledge of an important location; coordination of the group's direction); (2) resource acquisition (improved efficiency of resource acquisition by acting as a role model, punisher, manager, or volunteer); (3) within-group conflict (ingroup policing); and (4) between-group interaction (whether in a peaceful or hostile manner). We coded children's responses based on the presence or absence of each domain. Children's responses could reference all, none, or a subset of the four.

Overall, 53% of children mentioned at least one of the four domains. The remaining children provided either no response (e.g., "No idea!") (24%) or a response that did not fit within the domains (e.g., "Become the leader forever!") (23%). We excluded the former group of responses in the following analyses. Across the remaining responses, 21% of children mentioned *movement* (e.g., "He might go find the place where the water is and come back to the rest of the Dotis and he'll tell them where it is"); 58% mentioned *resource acquisition* (e.g., "He's going to make an invention that can get water"); and 10% mentioned *between-group interaction* (e.g.,

"He might fight them" or "It will respect the people who have the water, so they'll be friendly to them and they'll share the water"). No children mentioned *within-group conflict mediation* (i.e., ingroup policing), which may reflect the nature of the questions and contexts involved.

Using Fisher's Exact Tests, we examined whether children's likelihood of mentioning each domain varied by age, condition, or children's choice of leader (excluding *within-group conflict*, given that no children mentioned this domain). References to *movement* were more common among children who chose the *prestigious* (vs. *dominant*) leader (73% of responses; $p = .041$). References to *between-group interaction* were more common among older children (71% of responses provided by 6-year-olds; $p = .024$) and among children who chose the *prestigious* leader (86% of responses; $p = .050$). This latter pattern reflects the fact that children's responses more often focused on peaceful (vs. hostile) interactions with other groups. Responses that did focus on hostile interactions tended to describe the *dominant* leader (e.g., "He might fight them"). References to *acquisition* did not vary by leader type ($p = .813$), but the specific strategy of acquisition (i.e., role model, punisher, manager, or volunteer) children mentioned did ($p = .012$). Children who chose the *prestigious* leader most often describes them as a role model (i.e., source of strategy or privileged information) or manager (i.e., overseer of group efforts). Children who chose the *dominant* leader most often described them as a volunteer (i.e., provider; one who takes on the brunt of the work). All other effects were non-significant (all p's > .192).

Discussion

When asked to choose a new leader for a fictional town, children's choices depended on the current context in that town: Across early childhood, children tended to choose a dominant leader during times of between-group competition and a prestigious leader during times of within-group cooperation. This finding mirrors past research with adults (e.g., Kakkar &

Sivanathan, 2017; Laustsen & Petersen, 2017; Little et al., 2007; Nettle & Saxe, 2021; Re et al., 2013; Ronay et al., 2020; Sprong et al., 2019) and suggests that the impact of context on leadership preferences is rooted in patterns of thinking that emerge early in life.

Our findings also build on existing research on children's thinking about dominance and prestige. Prior research suggests young children can differentiate between dominance and prestige (e.g., N. Cheng et al., 2021; Kajanus et al., 2020; Margoni et al., 2018, 2022), and that by the early school years, children prefer prestigious (vs. dominant) individuals as friends (Amakusa et al., 2022; see also N. Cheng et al., 2021; Margoni et al., 2022). The present findings add nuance to this picture, showing that children's relative preferences for dominant and prestigious leaders are flexible, depending on context. Moreover, given that children associate dominance with meanness by at least age 3 (Cogsdill et al., 2014), our findings reveal that children do not merely associate leadership with positivity; instead, at least in some contexts, what children look for in leaders seems to differ from what children might value more broadly, or look for in, say, a friend (see also Laustsen & Petersen, 2015).

The critical effect we predicted—the condition difference—did not shift with age. But across contexts, children's overall rates of choosing dominant and prestigious leaders did. Whereas younger children tended to choose the dominant leader, with age, children were increasingly likely to instead choose the prestigious leader. Extending prior work (e.g., Bas & Sebastian-Galles, 2021; Gülgöz & Gelman, 2017; Hawley, 1999; Heck et al., 2022), this finding suggests preferences for dominance and prestige may unfold over different developmental timelines, with preferences for dominance emerging early and preferences for prestige developing more gradually.

Experiment 2

Experiment 1 presents a common real-world dichotomy—peace within a group vs. conflict between groups—and finds that children prefer prestigious leaders during times of peace and dominant leaders during times of conflict. These contexts notably differed in the number of groups involved, with the *competition* condition involving two groups and the *cooperation* condition involving a single group. One possibility is that our results in Experiment 1 depended on this difference, but we anticipated that this would not be the case. Instead, we expected that children's reasoning may depend more on whether a group is facing a time of greater competition or cooperation, irrespective of the number of groups involved. To test this possibility, in Experiment 2, we adapted the framings from Experiment 1 so that all children heard about both the Dotis and a second group. Between-subjects, we then manipulated whether the Dotis were working with or against this group. As in Experiment 1, children next learned that the Dotis were choosing a new leader and that there were two potential leaders, one dominant and one prestigious. We predicted that children would be more likely to choose the dominant leader when the town's problem involved competition vs. cooperation across groups, and again that, independent of condition, children would be increasingly likely to choose the prestigious (vs. dominant) leader with age.

Method

Participants

Participants included 96 3- to 6-year-old children, with an equal number of children within each age tested (48 girls, 48 boys; M_{age} = 59.90 months; *SD* = 13.83). We randomly assigned children to one of two between-subjects conditions: *between-group competition* (*n* = 48; M_{age} = 60.23 months; *SD* = 14.26) or *between-group cooperation* (*n* = 48; M_{age} = 59.56 months;

SD = 13.53). Participants were recruited through a university database or online advertisement and tested via Zoom. Children lived in 24 U.S. states, with 53% of participants living in Illinois. Two additional children were tested but excluded because they did not provide responses to the main dependent variable (*Leader Question*).

We asked children's parents (98% mothers; 2% fathers) to report child and family demographic information. Ninety-nine percent of parents reported children's race/ethnicity, of whom, 51.6% identified their children as White; 21.3% Bi- or Multiracial; 11.6% as Asian or Asian American; 8.4% as Black or African American; and 7.4% as Hispanic or Latin(o/a/e). Ninety-seven percent of parents reported family income, among whom annual income ranged from less than $15,000 to greater than $150,000, with a median income of $100,000–$149,999. Ninety-one percent of parents reported their political orientation on the same 7-point scale used in Experiment 1 (4% of parents provided no information; 5% said they "hadn't thought about it or didn't know"). Among those who placed themselves on this scale, the average response was 4.91 (*SD* = 1.53; 59% of parents identified on the liberal side of the scale; 22% as moderate; and 19% on the conservative side of the scale).

Procedure

The procedure was identical to Experiment 1 except that both framings involved another group. The *between-group competition* condition was identical to the condition of the same name in Experiment 1. In the *between-group cooperation* condition, children heard that the Dotis have to "work together with another group to get more water." We again asked children which Doti (*dominant* or *prestigious*) would be the leader (*Leader Question*) and to explain their response (*Explanation Question*). Because many children in Experiment 1 focused on *resource acquisition* in their answers to the *Solution Question* (a tendency that makes sense, given that the

experimental context focuses on a resource), we altered the wording in Experiment 2 to focus on the process rather than the outcome of the leader's efforts, asking children "How will that leader help the Dotis get more water?" (*Solution Question*).

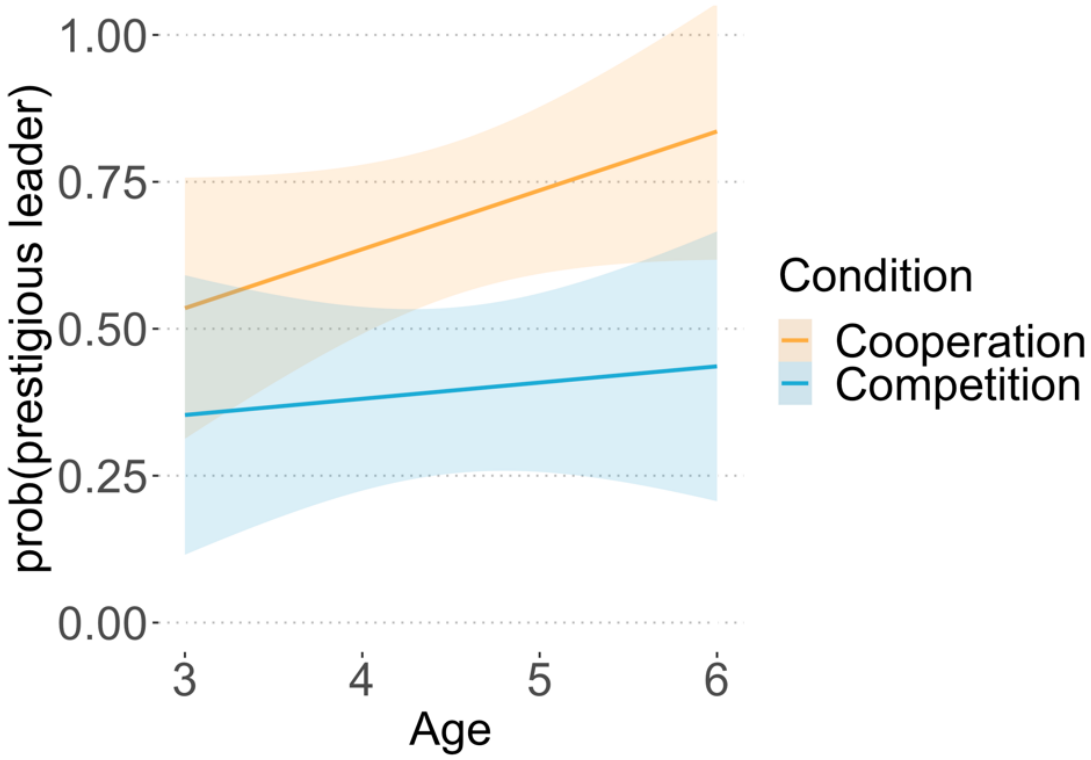
Results

As in Experiment 1, children in Experiment 2 showed no overall preference between the *dominant* and *prestigious* leaders (46% of children chose the *dominant* leader; not different from chance, $\chi^2(1) = 0.67$, $p = .414$, $V = .08$). Children's responses again depended, however, on the way the town's problem was framed: Children in the *between-group competition* condition were significantly more likely than children in the *between-group cooperation* condition to choose the *dominant* (vs. *prestigious*) leader (OR = 3.54, $\beta = 1.26$, 95% CI = [0.42, 2.15], $SE = 0.44$, Wald $\chi^2(1) = 8.31$, $p = .004$; see Figure 3.3).

Unlike in Experiment 1, there was no significant main effect of age (OR = 1.03, $\beta = 0.025$, 95% CI = [-0.01, 0.06], $SE = 0.02$, Wald $\chi^2(1) = 2.52$, $p = .11$; see Figure 3.3). However, it is worth noting that the 3-year-olds in the sample were particularly likely to choose the *prestigious* leader. An exploratory analysis including only the 4- to 6-year-olds in the sample revealed that among this subset, the age effect closely mirrored the effect observed in Experiment 1 (and pre-registered for Experiment 2): Whereas younger children tended to choose the *dominant* leader, a tendency to choose the *prestigious* leader strengthened with age (4- to 6-year-olds only: OR = 1.07, $\beta = 0.07$, 95% CI = [0.02, 0.13], $SE = 0.02$, Wald $\chi^2(1) = 7.28$, $p = .007$).

Figure 3.3

Effects of condition and participant age on responses to the *Leader Question* in Experiment 2



Note. Children's likelihood of choosing the *prestigious* leader in Experiment 2, by condition (*between-group cooperation* vs. *between-group competition*) and participant age.

There was again no significant interaction between condition and age (likelihood ratio test: $\chi^2(1) = 0.67$, $p = .414$, $V = .08$). There were likewise no effects of participant gender ($\chi^2(1) = 0.00$, $p = 1.000$, $V = .00$); side of the *prestigious* leader (i.e., left vs. right; $\chi^2(1) = 0.40$, $p = .528$, $V = .06$); or the color of each leader (i.e., red vs. blue; ($\chi^2(1) = 0.40$, $p = .528$, $V = .06$) on children's responses.

Open response data

Explanation question. We again coded children's explanations as: (1) *Uninformative/ Irrelevant* (25%); (2) repeating a *Trait* of the chosen leader (47%); (3) making a *Comparison* between the two leaders (16%); and (4) commenting on a *Function* of the chosen leader (13%).

Multinomial logistic regressions revealed that children's explanations did not vary by condition (p = .071). Children's explanations again changed with age (likelihood ratio test: $\chi^2(3) = 28.96$, $p < .001$, $V = .32$). This effect is driven by children being less likely to provide *Uninformative* explanations with age (p = .003). Children's explanations also varied by their choice of leader (likelihood ratio test: $\chi^2(3) = 9.35$, $p = .025$, $V = .18$). This difference was driven by higher rates of *Comparison* explanations among children who chose the *prestigious* leader (p = .058) and higher rates of *Trait* explanations among children who chose the *dominant* leader (p = .065).

Solution question. We coded children's responses to the *Solution Question* based on the presence or absence of each of the four domains introduced in Experiment 1. Overall, 53% of children mentioned at least one of the four domains. The remaining children provided either no response (26%) or a response that did not fit within the domains (17%). We excluded the former group of responses from analyses. Across the remaining responses, 23% of children mentioned movement; 52% mentioned *resource acquisition*; 1% mentioned *within-group conflict*; and 10% mentioned *between-group interaction*. Using Fisher's Exact Tests, we examined whether children's likelihood of mentioning each domain varied by age, condition, or children's choice of leader (excluding *within-group conflict*, since only one child mentioned this domain). References to *movement* were more common among older children (p = .002) and among children who chose the *prestigious* leader (81% of responses; p = .081). References to *acquisition* did not vary by leader type (p = .233), but the strategy of acquisition (i.e., role model, punisher, manager, or volunteer children mentioned did (p = .042). Children who chose the *dominant* leader tended to describe them as a volunteer (i.e., provided; one who takes on the brunt of the work), whereas children who chose the *prestigious* leader tended to describe them as role models (i.e., source of strategy of privileges information), managers (i.e., overseers of group efforts), and volunteers.

The leadership strategies children mentioned also shifted with age (p = .024): Whereas younger children tended to focus on leaders as volunteers, older children were more likely to additionally focus on leaders as role models and managers. All other effects were non-significant (all p's > .231).

Discussion

Children's choices of leaders for a fictional town again depended on the current context that town faced. Whereas children tended to choose a prestigious leader when the town was cooperating with another group, children were more likely to choose a dominant leader when the town was competing with another group. This effect of context reflected a difference in framing of just three words and further supports the idea that leadership preferences are remarkably sensitive to context beginning early in life.

Our findings in Experiment 2 build on those from Experiment 1 to further illuminate the psychological mechanism at play. That children's leader choices depended on context when both conditions involved another group (i.e., between-group competition vs. cooperation) suggests children's relative prioritization of dominance and prestige in leaders is sensitive to cues to competition vs. cooperation, specifically. At the same time, important open questions involve how cues to competition vs. cooperation may interact with the presence vs. absence of another group. Notably, we observed no difference in children's choices across our *within-* and *between-group cooperation* conditions in Experiments 1 and 2 (67% and 69% of children chose the *prestigious* leader in these conditions, respectively). This does not necessarily mean that the same would be true of children's reasoning about within- vs. between-group *competition*, but we expect this would be the case. In fact, we chose to compare cases of competition vs. cooperation across groups in Experiment 2 because the very presence of conflict within a group may lead

children to perceive the presence of more than one group; that is, conflict is itself a cue to group membership (e.g., see Ferera et al., 2018; Rhodes & Brickman, 2011).

An interesting alternative possibility is that the explicit presence of another group may amplify the effect of competition; that is, children may choose dominant leaders in contexts involving both within- and between-group competition (vs. cooperation) but be especially likely to do so in the between-group case. Future research might also examine whether children's leadership cognition is sensitive to the presence of another group in the absence of other cues. An intriguing possibility is that merely mentioning the presence of another group may lead children to infer greater competition. Such an effect may be further moderated by individual differences in children's own emerging worldviews (e.g., social dominance orientation; see Reifen-Tagar & Cimpian, 2021 for related findings).

Unlike in Experiment 1, we did not observe a main effect of age on children's leadership choices. However, further examination revealed a non-linear pattern, with the 3-year-olds in this sample being especially likely to choose the prestigious leader. When we examined the effect of age among only the 4- to 6-year-olds in the sample, we observed the same significant effect as in Experiment 1, such that children were increasingly likely across this age range to choose the prestigious leader. We continued investigating the effect of age on children's preferences for dominant vs. prestigious leaders in Experiment 3.

Experiment 3

In Experiment 3, our goal was to dig into the kinds of inputs that are often at the root of actual and perceived competition, and which may play a salient role in shifting around people's choices of leaders in the real world. We thus extended our investigation to a subtler, more indirect framing of competition vs. cooperation—the relative scarcity vs. abundance of

resources. Ranging from natural resources (e.g., water, land) to desired opportunities (e.g., jobs), the relative abundance (vs. scarcity) of valued resources can vary substantially across contexts and over time. Past research suggests that such fluctuation in the availability of resources can hold a variety of consequences for people's social thinking, including people's perceptions of competition (L. Cheng et al., 2021; Gordils et al., 2020; Kunst et al., 2017; Sánchez-Rodríguez et al., 2019), and what people look for in leaders (Andrews-Fearon & Davidai, 2023; Kakkar & Sivanathan, 2017; Nettle & Saxe, 2021; Ronay et al., 2020; Sirola, 2019; Sprong et al., 2019). For example, in one study spanning 69 countries and two decades, higher poverty, housing vacancy, and unemployment rates predicted greater support for dominant leaders (Kakkar & Sivanathan, 2017).

Given that young children expect there to be greater competition when resources are scarce (vs. abundant) (Rhodes & Brickman, 2011), we predicted that children's leadership preferences would be sensitive to the relative scarcity vs. abundance of resources beginning early in life. Following Rhodes & Brickman (2011), we told children that to get more water, the Dotis go to a well to which other groups also go. Between-subjects, children heard that the well had "a lot of water; always enough for all of the different groups" (resource abundance) or "only a little water; never enough for all of the different groups" (resource scarcity). We again asked children to choose between a dominant and prestigious leader for the town. We predicted that children would be more likely to choose the dominant leader when the town's problem involved resource scarcity (vs. abundance) and that children would be increasingly likely to choose the prestigious (vs. dominant) leader with age.

Method

Participants

Participants included 96 3- to 6-year-old children, with an equal number of children within each age tested (48 girls, 48 boys; M_{age} = 59.58 months; *SD* = 14.95). We randomly assigned children to one of two between-subjects conditions: *resource scarcity* (*n* = 48; M_{age} = 59.85 months; *SD* = 14.98) or *resource abundance* (*n* = 48; M_{age} = 59.31 months; *SD* = 15.08). Participants were recruited through a university database or online advertisement and tested virtually via Zoom. Children lived in 24 U.S. states, with 47% of participants living in Illinois. Three additional children were tested but excluded because they did not provide responses to the main dependent variable.

We asked parents (95% mothers; 5% fathers) to report child and family demographic information. All parents reported children's race/ethnicity, among whom, 54.2% identified their children as White; 17.7% as Bi- or Multiracial; 11.5% as Asian or Asian-American; 9.4% as Black or African American; 3.1% as Black or African American and White; and 3.1% as Hispanic or Latin(o/a/e). Ninety-nine percent of parents reported family income, among whom annual income ranged from less than $15,000 to greater than $150,000, with a median reported income of $100,000–$149,999. Ninety-two percent of parents reported their political orientation on the same 7-point scale used in the prior two experiments (6% of parents provided no information; 2% said they "hadn't thought about it or didn't know"). Among those who placed themselves on this scale, the average response was 4.61 (*SD* = 1.64; 52% of parents identified on the liberal side of the scale; 27% as moderate; and 20% on the conservative side of the scale).

Procedure

The procedure was identical to the prior two experiments, except that children learned that, to get more water, the Dotis go to a well. Drawing inspiration from Rhodes & Brickman (2011), we showed children a picture of this well and told children that many other groups also

go to this well. Between-subjects, children heard either that "there is a lot of water in the well… always enough water for all of the different groups" (*resource abundance*) or that "there is only a little water in the well…never enough water for all of the different groups" (*resource scarcity*). We again asked children which Doti (*dominant* or *prestigious*) would be the leader at this time (*Leader Question*) and to explain their response (*Explanation Question*). We asked the same *Solution Question* as in Experiment 2.

Results

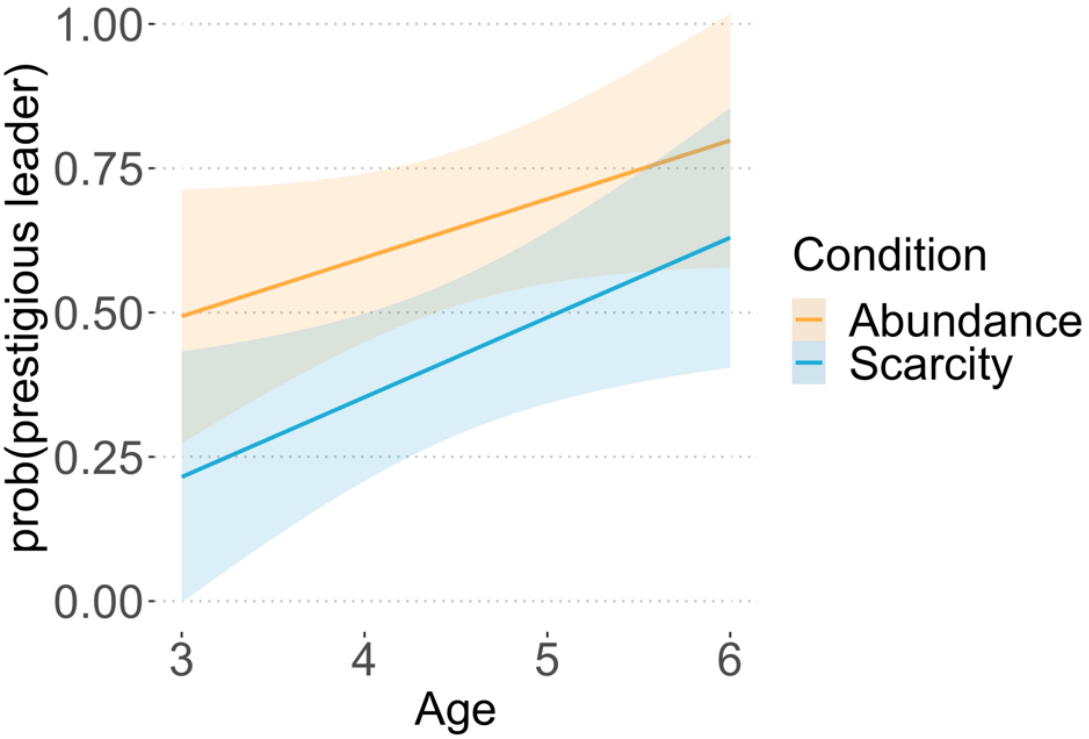
Overall, children were split between choosing the two leaders (47% of children chose the *dominant* leader; not different from chance, $\chi^2(1) = 0.14$, $p = .710$, $V = .04$). Children's choices once again varied depending on the way the town's problem was framed: Children in the *resource scarcity* condition were significantly more likely than children in the *resource abundance* condition to choose the *dominant* (vs. *prestigious*) leader (OR = 2.91, $\beta = 1.07$, 95% CI = [0.20, 1.98], $SE = 0.45$, Wald $\chi^2(1) = 5.62$, $p = .018$; see Figure 3.4).

Independent of condition, there was a main effect of age. With age, children were increasingly likely to choose the *prestigious* leader (OR = 1.05, $\beta = 0.05$, 95% CI = [0.02, 0.08], $SE = 0.02$, Wald $\chi^2(1) = 9.16$, $p = .002$; see Figure 3.4).

These condition and age effects did not significantly interact (likelihood ratio test: $\chi^2(1) = 0.70$, $p = .402$, $V = .09$) and there were again no effects of gender ($\chi^2(1) = 0.38$, $p = .540$, $V = .06$); side of the *prestigious* leader (i.e., left vs. right; $\chi^2(1) = 0.04$, $p = .838$, $V = .02$); or the color of each leader (i.e., red vs. blue; $\chi^2(1) = 0.65$, $p = .421$, $V = .08$) on children's choices.

Figure 3.4

Effects of condition and participant age on responses to the *Leader Question* in Experiment 3



Note. Children's likelihood of choosing the *prestigious* leader in Experiment 3, by condition (*resource abundance* vs. *resource scarcity*) and participant age.

Open response data

Explanation question. We again coded children's explanations as: (1) *Uninformative/ Irrelevant* (34% of responses); (2) repeating a *Trait* of the chosen leader (32% of responses); (3) making a *Comparison* between the leaders (9% of responses); and (4) commenting on a *Function* of the chosen leader (24% of responses). Multinomial logistic regressions revealed children's explanations changed with age (likelihood ratio test: $\chi^2(3) = 32.69$, $p < .001$, $V = .34$) but did not differ by condition ($p = .143$) or children's choice of leader ($p = .229$). With age, children were decreasingly likely to provide *Uninformative* responses ($p = .003$) and increasingly likely to provide *Function* responses ($p = .007$).

Solution question. We coded children's responses to the *Solution Question* based on the presence or absence of each of the four domains introduced in Experiment 1. Overall, 63% of children mentioned at least one of the four domains. The remaining children provided either no response (32%) or a response that did not fit within the domains (5%). We excluded the former group of responses from analyses. Across the remaining responses, 9% of children mentioned movement; 78% mentioned *resource acquisition*; 11% mentioned *within-group conflict*; and 8% mentioned *between-group interaction*. Using Fisher's Exact Tests, we examined whether children's likelihood of mentioning each domain varied by age, condition, or children's choice of leader. Likelihood of mentioning *acquisition* did not vary by leader type ($p = .229$), but the strategy of acquisition (i.e., role model, punisher, manager, or volunteer) children mentioned did ($p < .001$). All other effects were non-significant (all p's > .107).

Discussion

When asked to choose a new leader for a fictional group, children's choices reflected the relative abundance vs. scarcity of resources at that time. Whereas children valued prestige when resources were plentiful, children were comparatively more likely to choose a dominant leader when resources were scarce. This finding extends our results from Experiments 1 and 2 to a more indirect framing of competition vs. cooperation and demonstrates that young children can pick up on features of contexts that may give rise to actual, as well as perceived, competition, threat, or uncertainty in the real world.

Open questions involve how other cues to scarcity vs. abundance may inform children's leadership preferences. For example, future research could consider whether children show stronger preferences for dominant leaders when there is more limited access to desired resources or opportunities *within* a group (i.e., greater inequality). Other important questions concern how

children's *own* experiences with resource scarcity may shape their thinking about this variable (see Kirkland et al., 2021; Peretz-Lange et al., 2022; Wang & Roberts, 2023). Relatedly, future research may consider individual differences in children's *subjective* perceptions of resource scarcity vs. abundance. As discussed above, people vary in the extent to which they view the world as a naturally competitive place (e.g., Ho et al., 2012), as well as in the extent to which people view one individual's or group's gain as another's loss (i.e., zero-sum thinking, e.g., Andrews-Fearon & Davidai, 2023; Johnson et al., 2018). When shown a context involving resource scarcity, some children may infer greater competition than others, whereas other children may gravitate toward alternative potential solutions (e.g., individuals or groups working together to enlarge the collective pie).

Experiments 1–3: The role of parent political ideology

In a final, more exploratory analysis, we examined whether children's leader choices—independent of the contexts we showed—may reflect children's *own* local sociopolitical contexts; namely, children's parents' political ideologies. Prior research suggests those who identify as more conservative (vs. liberal) tend to view the world as a more competitive and hierarchical place (see social dominance orientation, authoritarian values; e.g., Altemeyer, 1998; Clifton & Kerry, 2022; Feldman & Stenner, 1997; Ho et al., 2012; Reifen-Tagar & Cimpian, 2022; Stenner, 2005); and that this link in turn explains conservatives tending to look more for strength and dominance in leaders (Kakkar & Sivanathan, 2017; Laustsen & Petersen, 2020; Sprong et al., 2019). As such, we explored the possibility that children of more conservative (vs. liberal) parents may be more likely to choose a dominant (vs. prestigious) leader.

Prior research provides evidence for intergenerational links in political ideologies and worldviews (Chatard & Selimbegovic, 2008; Jennings et al., 2009; Medjedovic & Petrovic,

2021; Meeusen & Boonen, 2022). However, historically, this body of research has largely ignored children prior to adolescence. This gap in the literature likely reflects the longstanding assumption that individual variation in sociopolitical worldviews manifests only in early adulthood (e.g., Altemeyer, 1981; Chatard & Selimbegovic, 2008; Duckitt, 2001; Duriez & Soenens, 2009), in addition to criticism of early work on political socialization, which overly embraced the idea that early-life political views would remain unchanged (e.g., see Cook, 1985; Flanagan & Sherrod, 1995; Greenstein, 1970; Marsh, 1971; Niemi & Hepburn, 1995).

Yet, contemporary approaches to studying political socialization embrace both stability and change over development (e.g., Abendschön, 2017; Heck, Santhanagopalan, et al., 2021; Reifen-Tagar & Cimpian, 2022; Sapiro, 2004), and a surge of recent research in developmental psychology has revealed that children begin reflecting their parents' political ideologies in their own beliefs and attitudes much earlier than previously believed (Guidetti et al., 2017; Leshin et al., 2022; Ran et al., 2023; Reifen Tagar et al., 2014, 2017; Wegemer & Vandell, 2020). For example, in one study, children whose parents reported higher (vs. lower) support for hierarchy (i.e., social dominance orientation), were less likely to penalize an ingroup member that withheld a resource from an outgroup member (Reifen Tagar et al., 2017). In another recent study, children's parents' political ideology predicted variation in how young children punished, with children of more conservative parents tending to focus more on punishing outgroup members, and children of more liberal parents tending to focus more on punishing ingroup members (i.e., to enforce cooperative norms; Leshin et al., 2022). Here, our goal was to build on this growing literature in the context of young children's developing leadership preferences.

Method

To maximize statistical power, we examined the relation between parents' political ideologies and children's leader choices across all participants in Experiments 1–3. As described above, we asked children's accompanying parents (96% mothers, 4% fathers across experiments) to report their political orientation on a 7-point scale from "extremely conservative" (coded as 1) to "extremely liberal" (coded as 7). Across experiments, 90% of parents did so (5% of parents provided no information; 5% of parents said they "hadn't thought about it or didn't know"). Among those who placed themselves on the scale, the average response was 4.90 (SD = 1.55; 59% of parents identified on the liberal side of the scale; 23% as moderate; and 19% on the conservative side of the scale).

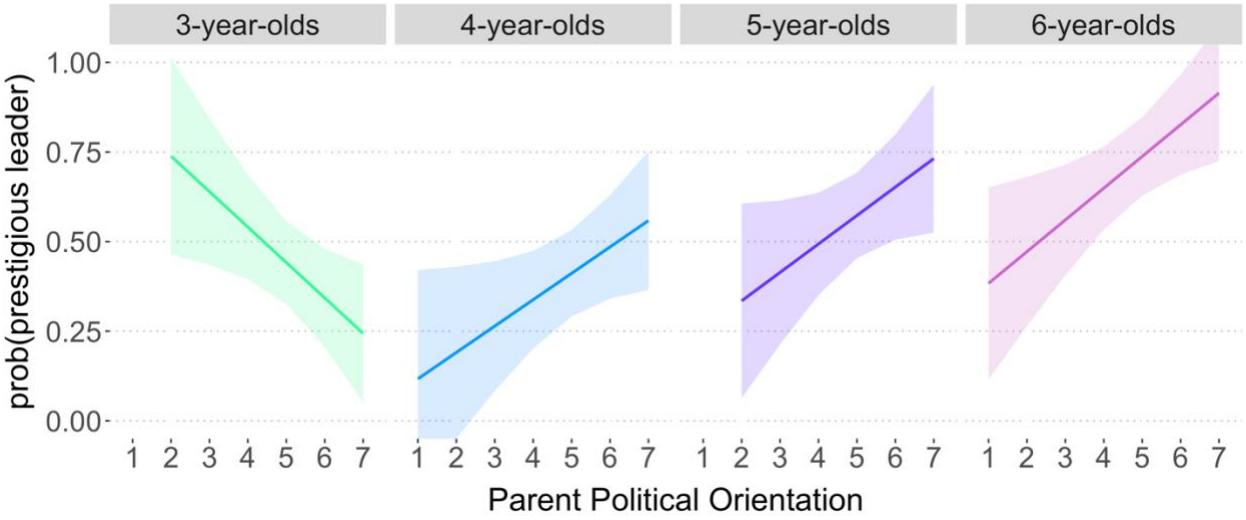
Results

We constructed a logistic regression model with children's choice of leader (*dominant*, *prestigious*) as the outcome and parent political orientation, participant age (in months), and condition as predictors, additionally examining two-way interactions between these variables. Independent of condition, there was a significant interaction between parents' political orientation and children's age (likelihood ratio test: $\chi^2(1) = 5.80$, $p = .016$, $V = .15$).[1] Among older—but not younger—children, children with more liberal parents were more likely to choose the *prestigious* leader, and children with more conservative parents were more likely to choose the *dominant* leader (see Figure 3.5).

[1] We additionally asked parents completing our demographic form to report children's second parent's political orientation, if relevant. Across experiments, 86% of parents provided this information (7% of parents provided no information; 7% of parents said they "hadn't thought about it or didn't know"). We constructed an identical logistic regression model as reported in the main text, but instead using children's other parent's political orientation as the predictor. This model likewise revealed a significant interaction between parental political orientation and children's age (likelihood ratio test: $\chi^2(1) = 5.80$, $p = .016$, $V = .12$).

Figure 3.5

Effects of parent political ideology and participant age on responses to the *Leader Question* across Experiments



Note. The relation between children's likelihood of choosing the *prestigious* leader in Experiment 1 and children's parents' political orientation (on a scale from 1 = "very conservative" to 7 = "very liberal"), split by children's age in years.

Discussion

Across early childhood, children's choices between a dominant and prestigious leader increasingly reflected their local sociopolitical environments (i.e., their parents' political ideologies). Specifically, mirroring prior research with adults (e.g., Kakkar & Sivanathan, 2017; Laustsen, 2017; Laustsen & Petersen, 2020; Sprong et al., 2019), the more liberal children's parents were, the more likely children were to choose the prestigious leader; in contrast, the more conservative children's parents were, the more likely children were to choose the dominant leader. This finding provides initial evidence that children begin transmuting their local sociopolitical contexts into their own leadership preferences within the first years of life.

It is notable that the relation between children's leader choices and their parents' political views strengthened over the age range tested and looked different among the youngest children (see Figure 3.5). Given that the youngest children in our sample were sensitive to the contexts we

showed (i.e., condition), this finding provides suggestive evidence that sociopolitical ideologies are likely transmitted across generations not solely through biological processes (i.e., genetics; but see Hatemi et al., 2014; Kleppestø et al., 2019), but also through cultural and psychological ones (e.g., everyday interactions, conversations, and experiences). Relatedly, the relation between children's leader choices and their parents' political ideologies does not necessarily mean that political ideology is the causal force at work. As reviewed above, political liberalism vs. conservatism correlates with a range of other sociopolitical values and worldviews. In addition, parental political ideology likely correlates with other factors including but not limited to broader parenting practices and messages (e.g., Feldman & Stenner, 1997; Wegemer & Vandell, 2020); the kinds of media to which young children are exposed (whether directly or indirectly; e.g., Mitchell et al., 2014); and, at least in the U.S., even the geographic settings in which children live (e.g., see partisan segregration, urban-rural divide; e.g., Brown & Enos, 2021; Gimpel et al., 2020; Rodden, 2019). Better understanding the specific inputs and mechanisms that shape the relation between children's leadership preferences and their parents' political ideologies is an important, and likely fruitful, line of future inquiry (see also Heck, Santhanagopalan, et al., 2021a; Reifen-Tagar & Cimpian, 2022).

It is worth noting that we observed no evidence of an interaction between parental political ideology and condition; that is, children with more conservative parents were more likely to choose the dominant leader overall, but parental political ideology did not seem to influence how sensitive children were to framings of competition (vs. cooperation) or resource scarcity (vs. abundance). Although this null finding should not be overinterpreted, this pattern parallels recent work with adults, which argues that contextual variation in leadership cognition may be similar across people from varied ideological backgrounds (e.g., see Nettle & Saxe,

2021). Instead, ideological differences may arise from the extent to which people tend to *perceive* the world as a naturally competitive and hierarchical place (i.e., ideological worldviews). In addition, people's sociopolitical ideologies and values can shape what *kinds* of contexts people view as competitive or threatening (e.g., Brandt & Bakker, 2022; Clifton & Kerry, 2022; Davidai & Ongis, 2019; Gordils et al., 2021). For example, liberals and conservatives vary in the extent to which they view a range of issues (e.g., immigration, climate change, shifting societal demographics) as threats (Brandt & Bakker, 2022; Clifton & Kerry, 2022; Fiagbenu & Kessler, 2022; Landau-Wells & Saxe, 2020; Leong et al., 2020); and whereas conservatives tend to display more competitive thinking when the status quo is challenged, liberals tend to display more competitive thinking when the status quo is maintained (Davidai & Ongis, 2019). There remain many open questions about how parental political ideology may shape children's perceptions of various issues (e.g., immigration, climate change, shifting societal demographics), as well as whether children of more conservative vs. liberal parents may show increased support for strong leaders when thinking about issues of different kinds.

Importantly, effects of parents' views on young children's leader choices do not imply that children's early views remain unchanged. As children grow, some children may map more closely onto their parents, and other children's views may wholly change. Indeed, although parents' and their adult children's sociopolitical views tend to correlate positively (e.g., Jennings et al., 2009; Medjedovic & Petrovic, 2021; Meeusen & Boonen, 2022), there is also evidence that many adult children do not align with their parents' views (e.g., Dinas, 2013; Ojeda & Hatemi, 2015). Important questions involve the factors that lead some children to follow their parents' sociopolitical views and other children to diverge (including during the early childhood years), as well as whether early-life views may hold lingering influences, even if they do change.

General Discussion

As the contexts in which people live shift over time—from relative peace to conflict, resource abundance to scarcity, certainty to uncertainty, and so on—so too do the contexts in which leaders are chosen or come into power. The present studies demonstrate that children's leadership cognition is sensitive to such contextual variation as early as age 3. This finding parallels prior research with adults (e.g., Kakkar & Sivanathan, 2017; Nettle & Saxe, 2021; Petersen & Laustsen, 2020; Sprong et al., 2019) and suggests that the impact of perceived competition vs. cooperation on leadership preferences has deep developmental roots. Indeed, across all studies, we saw no evidence that the effect of condition changed with age; that is, effects of context were as strong among the youngest children as they were among the oldest ones. Together, the present findings underscore how even subtle shifts in framing can hold meaningful consequences for what people look for in leaders, starting early in life.

The present work also provides initial evidence that children's own local contexts begin molding their leadership preferences within the first years of life. By around age 4, children of more liberal parents were particularly likely to value competence and prestige in leaders; in contrast, children of more conservative parents were comparatively more likely to value dominance and strength. Future research should aim to replicate and extend this finding, including in a more politically balanced sample, given that these analyses were not preregistered and that our sample was liberally skewed. However, our initial findings pave a path for important lines of future inquiry. In the face of vast political polarization, research with young children can provide a valuable perspective into the earliest roots of these divides (see also Heck, Santhanagopalan et al., 2021b; Reifen-Tagar & Cimpian, 2022).

Our findings regarding the role of parents' political ideologies also raise questions about what other features of children's social worlds may explain emerging individual differences in what children look for in leaders. For example, future research may consider the roles of factors including broader cultural norms and values (e.g., tighter vs. looser norms; collectivistic vs. individualistic cultures; see e.g., Aktas et al., 2016; Torelli et al., 2020); the presence and amount of conflict in children's local and global environments (e.g., times of greater peace vs. conflict; see e.g., Malcolm et al., 2020; Nasie et al., 2021; Safra et al., 2017); and the types of government to which young children are exposed (e.g., autocracies vs. democracies). In asking these and related questions, studies with young children can provide a unique lens into the emergence of cultural and contextual variation in leadership cognition over development, as well as into where there may be early cross-cultural similarities.

Across contexts, what children valued in leaders also shifted over the early childhood years, with children initially prioritizing dominance, but becoming increasingly likely between ages 3 and 6 to instead prioritize prestige. This finding provides explicit evidence of a pattern at which past work has collectively hinted: for example, whereas toddlers tend to like dominant agents (Bernard et al., 2016; Castelain et al., 2016; Enright et al., 2017; Thomas et al., 2016), this preference weakens over early childhood (Charafeddine et al., 2016); by elementary school, elementary school-age children tend to prefer prestigious over dominant individuals (Amakusa et al., 2022; see also N. Cheng et al., 2021) and expect others to do so, too (Kajanus et al., 2020). Open questions involve the mechanisms underlying this shift in what children look for in leaders. One possibility is that the development of children's leadership preferences parallels their understandings of related concepts; whereas reasoning about power and strength may be more concrete, reasoning about prestige may involve representing more abstract social relations and

concepts (see also Bas & Sebastian-Galles, 2021; Gülgöz & Gelman, 2017; Heck et al., 2022; Thomsen, 2020).

Differential timelines of preferences for dominance and prestige may offer insight into why some ways of thinking about leadership remain particularly intuitive and prevalent across the lifespan (Cao & Banaji, 2016) (Cao & Banaji, 2016; Eidelman et al., 2012; Gülgöz & Gelman, 2017; Lukaszewski et al., 2016; Toscano et al., 2014; Van Berkel et al., 2015; Zitek & Tiedens, 2012). For example, people process dominance hierarchies particularly quickly (Zitek & Tiedens, 2012). Moreover, a tendency to look for strength in leaders is not uncommon. In a nationally representative survey conducted in the U.S. in June 2022, 42.4% of people agreed with the statement that "having a strong leader for America is more important than having a democracy" (Wintemute et al., 2022).

An early-life tendency to view leadership as rooted in strength and power may also hold consequences for early emerging perceptions of whom leadership is "for." Particularly, an early preference for dominance may set the stage for the development of gendered thinking about leadership. By age 4, children across diverse cultural contexts associate dominance more with men than with women (Charafeddine et al., 2020; see also Mandalaywala et al., 2020; Terrizzi et al., 2019), and by the early school years, children tend to choose men more often than women for leadership roles (Mandalaywala & Rhodes, 2020; Santhanagopalan et al., 2022). The present findings raise the possibility that children may associate leadership more strongly with men in contexts involving competition (vs. cooperation). Indeed, by adulthood, there is extensive evidence for such contextual gendered effects (Baldner et al., 2022; Kim & Kang, 2022; Lawless, 2004; Lei & Bodenhausen, 2018; Smith et al., 2020; Spisak et al., 2012): for example, in one study, reading a news article that emphasized economic instability (vs. stability) took a

toll on people's evaluations of female, but not male, U.S. Senate candidates (Lei & Bodenhausen, 2018).

Other important questions involve how context may shape children's (and adults') thinking about leadership with respect to other social group identities (e.g., race, ethnicity, socioeconomic status, sexuality, language, immigration status), including in their many intersectional forms. For example, relevant to the present discussion, prior research has found that Black women tend to be stereotyped as more dominant than White women (Rosette et al., 2016), which may in turn lead Black women leaders to be less penalized for dominant behavior compared to White women leaders and Black men leaders (Livingston et al., 2012). Importantly, in other cases, Black women leaders may be *more* penalized (Livingston & Rosette, 2020; Rosette & Livingston, 2012), and a wide range of factors contribute to who tends to occupy leadership roles in the first place (N. E. Brown, 2014; Celis et al., 2015; Childs & Hughes, 2018; Fox & Lawless, 2005).

The present work raises a host of other questions about children's leadership cognition. For example, dominance and prestige are not necessarily dichotomous, as depicted in the present studies. In fact, dominance and prestige can even co-occur *within* individuals (e.g., Hawley, 2003; McClanahan et al., 2022; Van Vugt & Smith, 2019). Open questions involve the extent to which children represent this possibility, as well as whether children expect *individual* leaders to display different traits in different contexts. Relatedly, future research might examine children's preferences for dominance and prestige independently. This design could also provide insight into whether the effects of context we observed reflect an increased preference for dominance during times of competition, for prestige during times of cooperation, or both. Given that children prefer prestigious leaders in neutral contexts (Amakusa et al., 2022; N. Cheng et al.,

2021), our findings may be especially driven by a perception that dominant individuals are more competent in contexts involving competition (for related findings with adults, see Laustsen & Petersen, 2017), but this remains an open empirical question.

Other questions involve children's thinking about the behaviors of dominant and prestigious leaders once they occupy leadership roles. Children's open-ended responses to our *Solution Questions* provide some initial clues. For example, children spontaneously generated solutions reflecting themes including problem-solving ("The [prestigious leader] can help. Like, the smartest is which can solve the most problems"); agency and strength ("I think the [dominant leader] might run fast, and be confident, and try to stay strong"); diplomacy and negotiation ("The [prestigious leader] will respect the people who have water, so they'll be friendly to them and they'll share water"); and the use of sheer brute force ("The [dominant leader] can make sure to shout to start a war and maybe one of them will win"). Future research may extend and build on these preliminary themes. For example, research with adults underscores differences in dominant and prestigious leaders' use of punishment (Nettle & Saxe, 2021), and suggests that dominant and prestigious leaders present different kinds of risks: whereas prestigious leaders can pose risks to group coordination, dominant leaders more often risk group exploitation (de Waal-Andrews & Van Vugt, 2020; Van Vugt & Smith, 2019). Relatedly, some scholars have argued that leaders may strategically *construct* contexts that make themselves—or their desired policies or agendas—a more attractive fit (Lopez, 2020; McDermott, 2020). For example, more dominant leaders, who tend to be seen as voices of law and order, may purposefully promote perceptions of chaos or uncertainty (Homolar & Scholz, 2019; McDermott, 2020; Stanley, 2018). Open questions involve children's thinking about the relative strengths and risks of different leadership styles, and whether, and in what contexts, children expect leaders to frame situations in ways that

promote their own success. In asking these questions, future research may also consider how children themselves behave within leadership roles (see also French & Stright, 1991; Hawley, 1999), and whether children may take on different traits depending on the context involved.

Last, open questions involve children's thinking about broader group dynamics—and the interplay between leaders and followers—in the face of competition versus cooperation. Recent research suggests that even within the first year of life, infants expect individuals' ingroup allies to intervene on their behalf during between-group conflicts (Pun et al., 2021). Paired with the present findings, this research underscores how the same kinds of contexts may promote both preferences for dominant leaders and expectations of ingroup cohesion. Reflecting this idea, research with adults reveals a link between tight (vs. loose) group norms and preferences for strong leaders (Aktas et al., 2016). Based on such findings, future research may examine whether children associate dominant vs. prestigious leaders with different group dynamics, as well as whether children expect dominant and prestigious leaders (and their followers) to respond differently to those who deviate from group norms and beliefs (see also Roberts et al., 2021).

In sum, across three studies, children's choices between dominant and prestigious leaders were sensitive to the context in which the leader was being chosen. Whereas children prioritized prestige during times of cooperation and resource abundance, children were comparatively more likely to choose dominant leaders during times of competition and resource scarcity. Independent of context, children's leadership preferences also shifted over the early childhood years; whereas younger children tended to prefer dominant leaders, a preference for prestige strengthened with age, and this was particularly true among children with more liberal (vs. conservative) parents. Many questions remain regarding the emergence and development of leadership preferences. Understanding these early-life roots offers insight into the building blocks from which

sociopolitical though forms, and why some ways of thinking about leadership may remain intuitive across the lifespan and over time.

Part IV: Children's thinking about group-based social hierarchies[1]

[1] Paper published in *Trends in Cognitive Sciences* (Heck, Shutts, & Kinzler, 2022)

Across the world, wealth, power, and status are distributed unevenly (for definitions of terms used in this chapter and throughout the dissertation, see Table 4.1). Sociologists characterize these patterns of inequity as social stratification—the structuring of society into social hierarchies in which some groups of people hold greater wealth, power, and status than others. Importantly, social stratification intersects with other social categories (e.g., gender, race, nationality), resulting in specific types of stratification (e.g., gender stratification, racial stratification, global stratification) whereby people's group memberships shape their social standing, opportunities, and experiences in the world.

Research in social psychology has revealed that group-based hierarchies exist not only in the world but also in people's minds (Axt et al., 2014; Cheryan & Markus, 2020; Kteily et al., 2011). People's representations and attitudes regarding social hierarchies guide their social perceptions and interactions (Ho et al., 2013; N. S. Kteily et al., 2017), often leading to pernicious outcomes such as stereotyping and prejudice (Mandalaywala et al., 2018; Swencionis et al., 2021) and even the legitimization of structural inequalities in the world (Dupree & Torrez, 2021; Sibley & Duckitt, 2010; Hudson et al., 2019; Jost et al., 2015). On the flipside, an awareness of group-based hierarchies and inequalities in society also provides a necessary foundation for motivation toward social change (Craig et al., 2020; Kraus et al., 2019). For these reasons, an important question for psychological scientists concerns how group-based hierarchies *initially* become represented in people's minds, especially among young children as they first learn about social systems.

A surge of recent research on the development of social cognition investigates how young children learn and think about the stratified structure of the world around them. This research reveals that young children recognize and represent differences in wealth, power, and

status between social groups (e.g., Olson et al., 2012; Mandalaywala et al., 2020; Yazdi et al., 2020; Charafeddine et al., 2020; Santhanagopalan et al., 2022; Marshall et al., 2022). But beyond uncovering *when* representations of group-based hierarchies form, the value of a developmental perspective lies in the opportunity to uncover *how* these representations take shape. Studying thinking about group-based stratification as it develops allows for a real-time examination of the mechanisms at play, the influence of early-life contexts and experiences, and the routes through which children come to uphold or challenge societal structures.

In this paper, we first review research on children's conceptual abilities to recognize asymmetries in social rank—i.e., where people are positioned in a social hierarchy. We then turn to evidence that children begin thinking about different social *groups* as having differing amounts of wealth, power, and status. Next, we synthesize research on the mechanisms through which learning about group-based hierarchies in the world occurs. In the remainder of the paper, we focus on how children not only learn about the social world but become active participants in social systems, capable of reifying or rectifying the hierarchies about which they become aware (see Figure 4.1). Our goal in presenting this literature is to provide an overview of this quickly growing research area and to spark future questions within it.

Table 4.1

Glossary of terms

Term	**Definition**
Dominance	Control or force over others (see also power)
Essentialism	The view that an individuals' social category memberships reflect inherent, stable, and meaningful information about them.
Intersectionality	The interaction of social categories and associated forms of oppression producing individuals' specific identities and experiences
Power	The ability to influence or exert control over resources and outcomes, even in the face of opposition (see also dominance)
Prejudice	A valenced attitude about a social category
Prestige	Respect or admiration conferred by others (see also status)
Social category	A group of individuals who share socially relevant characteristics or features
Social categorization	The process of sorting individuals into groups based on societally relevant characteristics or features
Social dominance orientation (SDO)	A measure of an individual's acceptance and support for social social hierarchies
Social hierarchies	The ranking of individuals or groups along a valued dimension
Social rank	An individual or group's position within a social hierarchy
Social stratification	The structuring of society into social hierarchies based on wealth, power, or status
Status	Value and prestige in the eyes of others (see also prestige)
Stereotype	A generalized belief about a social category
Structural inequalities	Disparities in wealth, power, or status that are produced and upheld by societal institutions, values, and norms
Wealth	An individual's or groups' quantity and quality of resources and possessions

Note. Terms and definitions relevant to studying children's thinking about societal hierarchies.

Early abilities to recognize and reason about social rank asymmetries

Children are sensitive to basic markers of power asymmetries beginning early in life. For example, infants expect bigger (vs. smaller) individuals and numerically larger (vs. smaller) groups to prevail in zero-sum conflicts (Thomsen et al., 2011; Pun et al., 2016). Further, toddlers expect those who prevailed in the past to prevail in the future and across contexts (Bas & Sebastian-Galles, 2021; Mascaro & Csibra, 2012) and expect resource distributions to favor those who prevail (Enright et al., 2017).

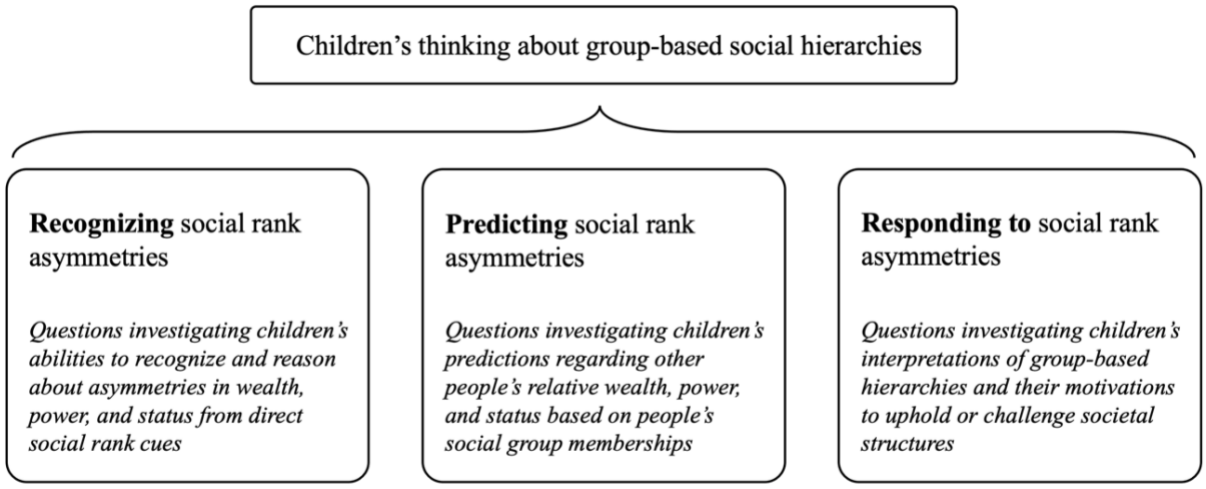
As children develop, the range of cues they recognize as indicating social rank broadens and becomes increasingly nuanced. Children begin inferring individuals' relative rank from cues including physical appearance (e.g., posture; facial features; Brey & Shutts, 2015; Terrizzi et al., 2019), resource quality and quantity (e.g., Shutts et al., 2016; Charafeddine et al., 2015; Enright et al., 2020; Gülgöz & Gelman, 2017), and degree of control and influence over others (e.g., Chudek et al., 2012; Enright et al., 2020; Gülgöz & Gelman, 2017; Kajanus et al., 2020; Over & Carpenter, 2015). In one study (Gülgöz & Gelman, 2017), researchers showed 3–9-year-old children vignettes depicting interactions between individuals and asked children which character was "in charge." By age 3, children said individuals who controlled resources, achieved goals, and gave others permission were "in charge," and by age 5, children also conferred rank to those who set norms (Gülgöz & Gelman, 2017). In sum, young children are sensitive to a range of cues to wealth, power, and status differences when thinking about individuals and their interactions.

Yet representing the structure of the social world involves not only noticing social rank asymmetries between *individuals* but also attending to broader patterns across *groups*. An emerging theme in recent years unites research on children's early sensitivity to social rank with research on the development of social categorization to ask whether children may also come to

view social identities as indicative of social rank. In the next section, we review evidence that children indeed begin using social category information to predict who is *likely* to hold greater wealth, power, and status. We focus in particular on gender and race as two prominent examples of social categories about which children's developing thinking increasingly reflects an awareness of group-based hierarchies in the world.

Figure 4.1

Three questions central to understanding children's thinking about group-based social hierarchies



Note. Questions focused on children's ability to recognize markers of social rank asymmetries (discussed in the section 'Early abilities to recognize and reason about social rank asymmetries') (left); Questions focused on children's group-based predictions about people's social rank (discussed in the section 'Using social category information to predict social rank') (center); and Questions focused on children's responses to social rank asymmetries (discussed in the section 'Responding to group-based social hierarchies') (right).

Power vs. status

Power and status often cooccur but are likely distinct. Whereas power is *enacted* (through control over resources and outcomes), status is *conferred* (through others' respect and valuation) (for a review, see Fiske et al., 2016; see also Cheng et al., 2013 and Maner, 2017 for a related

distinction between dominance and prestige, which map closely onto power and status, respectively).

Dual considerations of power and status appear in reasoning about social rank early in life. For instance, children differentially employ the same social rank cues depending on whether a context evokes power or status. For example, whereas infants expect physically bigger (vs. smaller) individuals to achieve their goals in zero-sum conflicts (that likely bring to mind considerations of relative power) (Thomsen et al., 2011), infants do not expect physically bigger individuals to prevail when one individual simply follows the other (without any indication of conflict) (Thomsen, 2020). Likewise, whereas infants and children think numerically larger *groups* are more likely to prevail in zero-sum resource conflicts (Pun et al., 2016; Lourenco et al., 2016; see also Part II), young children do not necessarily view larger group size as a cue to higher status (see Part II).

Young children also hold different *expectations* about those with power vs. status. In one study (Margoni et al., 2018), 21-month-old children were introduced to a group and an individual who acquired social rank through either force or respect. Whereas toddlers expected the group to obey the forceful individual only in this individual's presence, toddlers expected the group to obey the respected individual in this individual's presence *and* absence (Margoni et al., 2018). Thus, young children distinguish between power and status, both in the cues they use to infer social rank and in their expectations of high-power and high-status individuals.

At the same time, further evidence suggests a distinction between power and status widens gradually over early childhood (Kajanus et al., 2020; Cheng et al., 2021) and that whereas reasoning about power seems to emerge early and remain relatively stable over development, reasoning about status develops more gradually over the early childhood years (see

Part II). One possibility is that reasoning about power may be more concrete—often based in physical interactions or represented visibly—whereas reasoning about status may involve representing more abstract social relations and concepts (e.g., respect, social value, knowledge). Whether and how differences in the developmental trajectories of reasoning about power and status inform the development of children's thinking about group-based hierarchies remain important open questions, but an intriguing possibility is that notions of social rank emerging earliest in life (e.g., power, dominance) may remain particularly intuitive into adulthood.

Using social category information to predict social rank

Children's thinking about gender and social rank

Children's early emerging tendency to prefer people in their own gender group is one of the most commonly replicated findings in the gender cognition literature (e.g., Gülgöz et al., 2019; Halim et al., 2017). Children's gender ingroup favoritism suggests they might confer higher rank to members of their own gender group, just as they confer other positive attributes to their own group. However, recent research reveals a different picture: By the early elementary school years, both boys *and* girls view boys as having greater decision-making power (Mandalaywala et al., 2020; Charafeddine et al., 2020; Terrizzi et al., 2019), more resources (Charafeddine et al., 2020), and higher-status positions (Bos et al., 2022; Charafeddine et al., 2020; Liben & Bigler, 2002; Patterson et al., 2019; Santhanagopalan et al., 2022) compared to girls. Indeed, the disconnect these studies reveal between girls' social preferences and awareness of inequities demonstrates how children's appreciation of social stratification goes beyond simple ingroup–outgroup categorization.

In one study, 3–6-year-old children in the U.S. viewed a rope ladder (see Figure 4.2) and heard that the top (vs. bottom) of the ladder indicated having more toys and clothes and greater

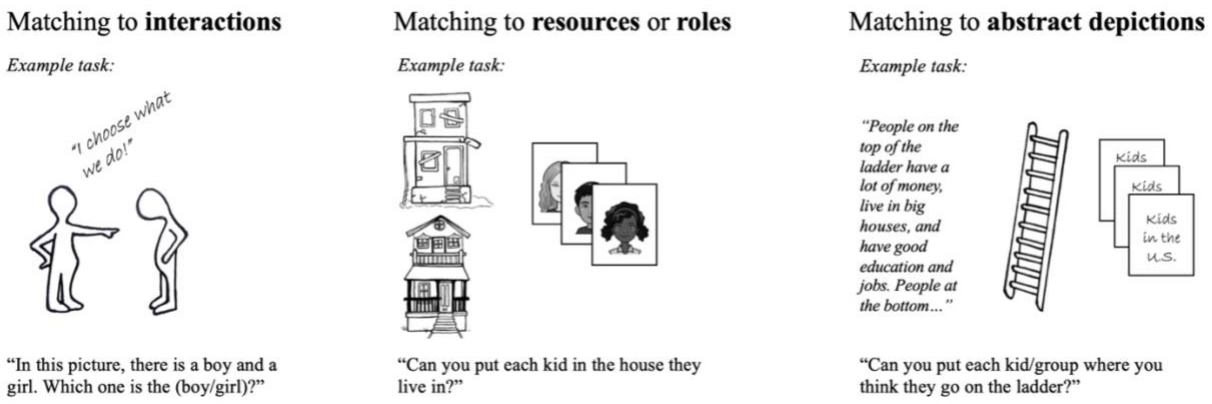
control over what other people do. When asked to place boy and girl characters onto the ladder, children tended to place boys higher than girls, an effect that was particularly strong among boys (Mandalaywala et al., 2020; see Charafeddine et al., 2020 for similar evidence with children in France, Lebanon, and Norway). Moreover, although girls showed strong ingroup favoritism when asked which characters they *preferred*, at no age did girls place girl characters above boy characters on the ladder, and with age, girls' placement of girls increasingly declined (Mandalaywala et al., 2020).

Children likewise view boys and men as more likely to hold high-status roles. For instance, when asked to draw a leader, elementary school-age children in India and the U.S. were more likely to draw boys and men (vs. girls and women) (Santhanagopalan et al., 2022; Bos et al., 2022), and children also tend to choose boys more often than girls for leadership roles (Santhanagopalan et al., 2022; see also Mandalaywala & Rhodes, 2020). By age 6, children in the U.S. also associate (White) men more than women with being "really, really smart" (Bian et al., 2017; Jaxon et al., 2019), which is notable given that: (1) by adulthood, judgments of competence are central to conceptualizations of status (e.g., Oldmeadow & Fiske, 2007) and (2) associations between brilliance and different fields predict actual patterns of gender representation across fields (Leslie et al., 2015). Children even use gender to guide their thinking about the status of *novel* roles. In one study, when children in the U.S. were asked questions like how important fictional jobs were and how much money people with them earned, 11–12-year-old (but not 6–8-year-old) children inferred jobs presented with women workers were less important and lower-paying than jobs paired with men (Liben et al., 2001). In sum, children's thinking about social rank becomes gendered: Children view gender as informing who holds

higher rank in ways that reflect real-world gender gaps in wealth, power, and status that tend to favor men.

Figure 4.2

Three common methods to examine children's awareness of group-based social hierarchies



Note. Tasks in which children are asked to match individuals and groups to interactions (left); tasks in which children are asked to match individuals and groups to different resources (in terms of quality or quantity) or roles (e.g., occupations, positions in a classroom) (center); and tasks in which children are asked to match individuals and groups to abstract depictions of hierarchical dimensions (right). These methods are flexible with respect to the hierarchy-related concepts they can be used to measure (e.g., wealth, power, and status, as well as multiple concepts simultaneously). In the above examples, matching to interactions is being used to assess children's thinking about power (e.g., Charafeddine et al., 2020), matching to resources/roles is being used to assess children's thinking about wealth (e.g., Olson et al., 2012; Mandalaywala et al., 2020; Shutts et al., 2016), and matching to abstract depictions is being used to assess children's thinking about status and wealth (e.g., Yazdi et al., 2020; Chen et al., 2019; see also Mandalaywala et al., 2020; Marshall et al., 2022, which use a similar method to measure children's thinking about power and wealth).

Children's thinking about race and social rank

Children's expectations and evaluations of other people are also shaped by cues to people's race (e.g., Hwang et al., 2021; Roberts et al., 2017; but see Shutts et al., 2013; Weisman et al., 2015 for evidence that thinking about race develops more gradually than thinking about gender). Beginning in childhood, even children's racial *preferences* reflect an awareness of group-based hierarchies: Whereas children from racial groups with greater wealth, power, and

status tend to prefer their own group (e.g., Baron & Banaji, 2006), ingroup favoritism is often absent (e.g., Dunham et al., 2007; Newheiser & Olson, 2012; Setoh et al., 2019) or even reversed (i.e., in favor of an outgroup; e.g., Marshall et al., 2022; Newheiser et al., 2014; Stepanova et al., 2021) among children from racial groups with less wealth, power, and status. Moreover, children's *relative* preferences between racial groups other than their own tend to parallel group-based hierarchies and attitudes in the world (e.g., Chen et al., 2018; Qian et al., 2019; Sacco et al., 2019; Yazdi et al., 2020).

Children's attunement to racial hierarchies is also evident in studies that directly examine children's race-based inferences. For instance, by age 4, children in the U.S. predict White people have more and better resources than Black people (Elenbaas & Killen, 2016; Mandalaywala et al., 2020; Shutts et al., 2016) (see Figure 4.2). Similarly, children in South Africa associate higher-value belongings with White people over Coloured people (i.e., multiracial people), and Coloured people over Black people, thus reflecting the racial hierarchy once institutionalized and still pervasive in their country (Olson et al., 2012; see also Newheiser et al., 2014).

There is growing evidence that children also use race to guide their thinking about others' power and status. In one study, 7–10-year-old Chinese American children introduced to a status ladder (similar to the rope ladder described earlier; see Figure 4.2) predicted White children, but not Black children, would be at the top (S. H. Chen et al., 2019; but see Mandalaywala et al., 2020 in which 3–6-year-old children in the U.S. did not make this inference). Notably, research suggests children make similar predictions even in contexts where White people are not the numerical majority. For instance, Black African children in a homogeneous Black community in Uganda placed White children above Black children on a status ladder (Marshall et al., 2022). In

another study where children predicted which student in a class had been chosen as class president, 5–10-year-old children in India tended to select White and lighter-skinned South Asian students and were unlikely to select Black and darker-skinned South Asian students; this pattern reflects the roles of race and skin tone (i.e., colorism) in children's leadership cognition (Santhanagopalan et al., 2022; see also Patterson et al., 2019; (Santhanagopalan et al., 2022' see also Patterson et al., 2019; Patterson et al., 2013 for evidence that children in the U.S. view race as influencing election outcomes). As with gender, race also seems to inform children's thinking about novel occupational roles: In one study, 6–7-year-old Black children in the U.S. indicated that fictional jobs portrayed with White employees were more important and higher-paying than jobs portrayed with Black employees or both Black and White employees (Bigler et al., 2003). Thus, children also view race as informing social rank, reflecting an awareness from an early age of racial hierarchies and inequalities visible in the world.

Decoupling social rank and social preferences

It makes sense that children's social preferences and their thinking about societal-level hierarchies may often parallel one another. One way to think about group-based hierarchies (and particularly *status* hierarchies) are as society's relative valuation of different groups (i.e., societal-level preferences). Reflecting this, children's relative preferences between outgroups mirror groups' relative positions in group-based hierarchies and inequalities in the world (Chen et al., 2018; Qian et al., 2019; Sacco et al., 2019; Yazdi et al., 2020), and children's inferences about groups' relative wealth, power, and status often correlate positively with children's social group preferences (Heck, Kushnir, et al., 2021; Horwitz et al., 2014; Marshall et al., 2022; Newheiser et al., 2012; Shutts et al., 2016; Yazdi et al., 2020).

At the same time, research provides evidence that children's thinking about social rank goes beyond simple ingroup–outgroup categorization or their preferences for some groups over others. For example, although 5–10-year-old children in India ascribed higher status to speakers of British-English than speakers of Tamil (their linguistic ingroup), they tended to say speakers of Tamil were kinder (Santhanagopalan et al., 2021). In another study, 3–6-year-old girls in the U.S. chose gender ingroup members as social partners, but they did not associate their gender ingroup with having greater wealth or power (Mandalaywala et al., 2020; see also Bian et al., 2017).

Further, recent evidence suggests children's conceptualizations of social rank are not always positive. For example, children associate being "in charge" with *not* helping others (Terrizzi et al., 2020), and by age 3, children view malevolent displays of power and status (e.g., not giving permission, taking resources) as indicative of social rank (Gülgöz & Gelman, 2017).

Moreover, children develop increasingly specific and nuanced ideas about relations between social rank and various positive traits. For example, whereas 4–5-year-old children in one recent study associated prosociality and effort with being rich, these associations weakened with age, such that by the late elementary school years, children instead associated these traits with being poor (Yang & Dunham, 2022). Providing further evidence of specificity to children's thinking about social rank, 5–10-year-old children in India predicted that lighter-skinned South Asian and White boys would be chosen as class president but not necessarily for other positive (but relatively lower-status) classroom roles (Santhanagopalan et al., 2022). Together, these findings demonstrate specificity to children's reasoning about social rank, while at the same time underscoring the close ties between social hierarchies and social preferences, both in children's reasoning and in the world.

Other social categories and intersectional considerations

Children's awareness of group-based hierarchies is not limited to their thinking about gender and race but extends to other social categories that are constructed and reinforced by society (e.g., nationality, accent, language). For instance, 7–12-year-old children in Iran view American children as higher-status than Iranian children (Yazdi et al., 2020); 9–10-year-old children in the U.S. view speakers of Northern-accented (vs. Southern-accented) American English as more likely to be "in charge" (Kinzler & DeJesus, 2012); and 5–10-year-old children in India view speakers of British-English as "better leaders" than speakers of Indian-English, Tamil, and Hindi (Santhanagopalan et al., 2021).

At the same time, our focus on gender and race above reflects the fact that most research on children's thinking about group-based hierarchies has focused on these two social categories. There remain many questions regarding children's thinking about social rank and other social categories, including intersectional categories (e.g., gender *and* race) (Outstanding Questions). Children consider social categories in intersectional ways (Lei et al., 2020; Perszyk, Lei, et al., 2019) and preliminary evidence indicates that intersectional considerations extend to children's thinking about hierarchies between groups (Santhanagopalan et al., 2022; Jaxon et al., 2019). However, many questions remain unanswered in this space.

Mechanisms of learning about group-based social hierarchies

Focusing on children's developing thinking, both within and across cultures, provides opportunities to identify the inputs through which group-based hierarchies become represented in people's minds. Further, uncovering how children come to think about group-based hierarchies can provide insight into how intergroup biases related to groups' relative social rank may be

mitigated and reshaped—especially early in life when children's attitudes are still forming and may be more malleable.

Direct observations

One way children could learn about group-based hierarchies is by directly observing differences in groups' wealth, power, or status. As noted earlier, children are well-attuned to markers of social rank (e.g., Gülgöz & Gelman, 2017; Enright et al., 2020). Moreover, children are excellent at pattern detection across a variety of domains (e.g., Saffran & Kirkham, 2018). To test children's ability to learn from patterns of social rank across groups, researchers (Horwitz et al., 2014) showed 4–5-year-old children simple pictures in which people from two novel groups were paired with high-wealth versus low-wealth homes. Here—and in many studies reviewed in this section—the researchers focused on children's thinking about *novel* groups to eliminate the possibility that children enter the study with prior knowledge of, or diverse experiences with, the groups under study. After viewing the pictures, children later generalized the patterns they observed to new members of the groups. Moreover, when children were assigned to either the high- or low-wealth group, only children assigned to the high-wealth group reported liking their own group over the other group (Horwitz et al., 2014). Importantly, the researchers never labeled or otherwise pointed out that the groups differed in wealth. Such findings reveal children's capacity for rapid learning—just through observation—about correlations between groups and social rank.

Direct observations of particular group-based hierarchies may not always be possible in children's local environments. For example, in studies described earlier, children in India associated leadership with White and lighter-skinned South Asian boys yet lived in a region where nearly everyone is darker-skinned (Santhanagopalan et al., 2022), and children in Uganda

with little exposure to White individuals identified White children as higher-status than Black children (Marshall et al., 2022). In such cases, and in general, children may also learn about broader patterns in society from media and other materials (e.g., TV, magazines, religious and educational materials; see e.g., Lay et al., 2019; Marshall et al., 2022; Santhanagopalan et al., 2022; Weisbuch et al., 2009).

People's nonverbal behaviors and intergroup interactions

Other people (e.g., parents, teachers, peers) also play a central role in transmitting information about group-based hierarchies. One way children could learn about groups' relative rank from other people is by observing others' treatment of people from different groups (including children themselves). Extensive research suggests children glean information about the social world by watching others interact. Much of this research has focused on how patterns of interaction guide children's thinking about broader social attitudes. For example, preschool-age children attend to which groups people lean in and smile toward versus lean away from and scowl at to infer people's group-based preferences (Castelli et al., 2008; Skinner et al., 2017).

An emerging body of research suggests children similarly watch people's nonverbal behaviors and interactions to learn about individuals' (Chudek et al., 2012; Brey & Shutts, 2018) and groups' (Brey & Pauker, 2019; Heck, Kushnir, et al., 2021; Sierksma & Shutts, 2020) social rank. For example, children learn about groups' relative status by tracking others' social choices—which groups people engage with or select for positive roles (Heck, Kushnir, et al., 2021). In one study, after watching an agent repeatedly choose members of one group over another, preschool-age children reasoned that members of the chosen (vs. unchosen) group were more likely to be leaders (Heck, Kushnir, et al., 2021). Children also form attitudes about groups' relative competence from teachers' nonverbal behaviors (e.g., smiling vs. frowning, head

nodding vs. shaking; Brey & Pauker, 2019) and teachers' decisions about which groups to help (Sierksma & Shutts, 2020). Whether children view competence as indicative of status remains an open question, though by adulthood, judgments of competence and status are closely linked (Oldmeadow & Fiske, 2007; see also Shutts et al., 2016; Yang & Dunham, 2022 for evidence that children link wealth and competence).

People's verbal statements about groups

Another way children learn about group-based hierarchies is through other people's verbal statements, which may play an especially central role in transmitting *negative* attitudes regarding groups' relative wealth, power, and status. Indeed, research suggests children can form negative attitudes quickly from what others say about groups: In one study, 4–9-year-old children heard explicitly negative statements about a novel group. After a single instance—and whether the information was directed at children or overheard—children were less likely to want to engage with the group's culture (e.g., to eat their food or learn their language; Lane et al., 2020)

Of course, people often make concerted efforts *not* to convey negative attitudes about groups' relative wealth, power, or status. Yet children also attend to subtler elements of what people say about groups (Patterson & Bigler, 2006; Rhodes et al., 2017; Segall et al., 2015). For example, generic statements about groups (e.g., "girls like pink"), in contrast to specific statements about individual group members (e.g., "this girl likes pink"), are more likely to lead children to view group membership as inherent and informative (e.g., Gelman & Roberts, 2017; Leshin et al., 2021), which is particularly relevant given evidence that essentialist views of group membership predict greater endorsement of group-based hierarchies among adults (Mandalaywala et al., 2018). Even verbal statements intended to rectify group-based hierarchies

(e.g., “girls are as good at math as boys”) can unintentionally reinforce them by positioning one group (here, boys) as the point of reference (Chestnut et al., 2021). Thus, both the plain content and the subtler structure of others’ verbal statements can shape children’s learning about groups’ relations to one another.

Importantly, in some cases, the *absence* of verbal input may also shape children’s thinking about group-based hierarchies (e.g., "colorblind" parenting; e.g., Pahlke et al., 2012). Without a framework through which to interpret the social rank asymmetries they observe, children may see group-based inequities as the way things *should* be (Roberts et al., 2016; Tworek & Cimpian, 2016) or as reflecting inherent characteristics of groups (Hussak & Cimpian, 2018). On the flipside, talking to children about the structural and historical origins of group-based hierarchies can help mitigate and reshape the development of intergroup biases related to social rank (Hughes et al., 2007; Weisgram & Bigler, 2007). We return to these points below in discussing how children explain group-based hierarchies.

Context matters

Both *what* and *how* children learn about group-based hierarchies is importantly tuned by children’s social environments (e.g., country, region, culture). Regarding *what* children learn, there is variation across contexts in which aspects of social rank (e.g., wealth, power, status) are most valued, and recent research suggests this variation is evident in young children’s reasoning. For example, preschool-age children in France prefer dominant individuals more than preschool-age children in Japan do (Charafeddine et al., 2019), mirroring differences in adults’ valuing of dominance across these contexts (Charafeddine et al., 2019; for similar findings with 5–12-year-old children in the UK and China, see Kajanus et al., 2020).

Contexts also vary in terms of which social categories (e.g., gender, race, ethnicity, language, religion, immigration status, etc.) are most prominent in people's conceptualizations of the social world. Such variation likely informs which group-based *hierarchies* are most salient to young children growing up in different contexts. In other cases, group markers—and associated hierarchies—may be similarly salient across contexts. For example, recent research in Lebanon, France, and Norway (countries with notable variation in gender inequality) found substantial similarity in preschool-age children's reasoning about gender and social rank (Charafeddine et al., 2020).

Regarding *how* children learn about group-based hierarchies, children's contexts inform the observations they can make and from whom and what experiences they learn. Even children who show similar thinking on the surface may learn in vastly different ways. For example, there is evidence that children in India (e.g., Santhanagopalan et al., 2022), South Africa (e.g., Olson et al., 2014), Uganda (e.g., Marshall et al., 2022), and the U.S. (e.g., Shutts et al., 2016) associate White people with high social rank, but children in these four countries live in considerably different racial landscapes. Important unanswered questions concern whether the *way* children learn about group-based hierarchies (independent of the content of children's thinking) holds lasting consequences, such as for the approaches that are most effective in reshaping intergroup biases across contexts. Further, identifying contexts in which children do *not* make group-based predictions about social rank can illuminate what contextual features produce differing patterns of early-life thinking. For example, recent research conducted in the Dominican Republic—where multiracial individuals are the numerical majority and race is largely conceptualized as a continuous (vs. discrete) construct—found little evidence that 6–11-year-old children used race as a cue to wealth or status (Reyes-Jaquez et al., 2021). In sum, context matters for children's

thinking about group-based social hierarchies, and an understanding of cross-contextual variation can provide valuable insight into how learning about group-based hierarchies occurs.

Integrating cues to group-based social hierarchies

A complete picture of how children learn about group-based hierarchies will involve understanding how various inputs work in tandem to shape children's thinking. When inputs align, they may be especially impactful. In other cases, inputs may not align. As one example, children may hear adults say both boys and girls are leaders but more often observe boys and men in leadership roles. Important unanswered questions concern how children integrate cues to group-based hierarchies and how matches versus mismatches in cues inform children's developing thinking.

Responding to group-based social hierarchies

So far, we have discussed *what* children learn about group-based hierarchies and *how* this learning occurs. But with age, children also become increasingly active participants in the societal systems about which they learn, encountering situations in which they can endorse group-based hierarchies or take actions to change them. Indeed, an awareness of group-based hierarchies provides a foundation on which both stereotyping of individuals and efforts to rectify group-based inequities can form. Understanding what factors shape children's responses to group-based hierarchies is particularly important for understanding how systems of inequity are perpetuated across generations and for illuminating potential entry points for change.

In the following section, we review recent research focused on the routes through which children come to uphold or challenge group-based hierarchies. In synthesizing this literature—most of which has focused on children's responses to group-based resource inequalities and social exclusion—we identify four factors that inform children's responses: (1) children's

explanations of group-based hierarchies; (2) children's age; (3) children's and their parents' support for social hierarchy; and (4) children's own objective and subjective social standing.

Inherent versus structural attributions

One factor shaping whether and how young children respond to inequities between groups is the extent to which children view differences in groups' social rank as reflecting inherent differences between groups (An et al., 2020; Hussak & Cimpian, 2018; Peretz-Lange & Muentener, 2021; Rizzo et al., 2020, 2021). Specifically, the more children view group-based hierarchies as reflecting *intrinsic* differences in groups' characteristics or abilities, the more likely children are to endorse and perpetuate group-based inequities. In contrast, the more children view group-based hierarchies as the product of *extrinsic* societal structures that benefit some groups over others, the more likely children are to challenge and rectify inequities between groups. For example, in one study, the more 4-year-old children in the U.S. attributed racial wealth inequality to "who (people) are on the inside" (inherent explanation) versus "things that happen in the world" (structural explanation), the more they preferred to play with White over Black children (Rizzo et al., 2021). Similarly, when introduced to a status disparity between two novel groups, children who heard an extrinsic (vs. intrinsic) framing for the disparity were more likely to suggest structural interventions and to want to befriend members of the lower-status group (Peretz-Lange & Muentener, 2021; see also Hussak & Cimpian, 2018).

Despite the benefits that structural understandings of group-based hierarchies hold, there is evidence that children more readily attribute group-based hierarchies to inherent (vs. structural) causes (Hussak & Cimpian, 2015; Peretz-Lange et al., 2021; Peretz-Lange & Muentener, 2019) In the study just mentioned (Peretz-Lange & Muentener, 2021), children who heard *neutral* framing reasoned identically to children who heard inherent framing, suggesting

inherent explanations may be children's default. Indeed, in another study, 5- and 8-year-old children asked to explain an inequality between two novel groups were considerably more likely to generate inherent (vs. structural) explanations (Hussak & Cimpian, 2015).

In sum, an awareness that group-based social rank asymmetries are due to structural causes (vs. inherent features of groups) leads children to rectify group-based inequities and lessens children's tendency to form negative attitudes about groups with lower wealth, power, or status (Hussak & Cimpian, 2018; Peretz-Lange & Muentener, 2021; Rizzo et al., 2021). However, children's capacity to reason about the structural causes of group-based hierarchies seems to depend on *explicitly* providing children with a structural framework. When left to draw their own conclusions, children tend to view descriptive differences between groups as inherent distinctions between them (Hussak & Cimpian, 2018; An et al., 2020) and even as the way things *ought* to be [Roberts et al., 2016; Tworek & Cimpian, 2016).

Changes over development

Children's responses to group-based hierarchies also shift with age. Young children typically endorse and perpetuate group-based hierarchies (Hussak & Cimpian, 2018; (Hussak & Cimpian, 2018; Mandalaywala et al., 2021; Olson et al., 2011); it is not until later in the elementary school years that children typically challenge and rectify inequities between groups (Elenbaas et al., 2016; Essler & Paulus, 2021; Olson et al., 2011; Yang & Dunham, 2022). Even in cases where younger children *do* challenge group-based inequities, their tendency to do so increases with age (e.g., Corbit et al., 2021). Further, older children are more likely than younger children to view and explain group-based hierarchies through a structural lens (Hussak & Cimpian, 2015; Peretz-Lange et al., 2021). One possibility is that children's explanations for group-based hierarchies and their responses to them develop in parallel.

It is notable that even adults show a tendency toward generating inherent explanations for group-based social rank asymmetries (Hussak & Cimpian, 2015)—and whereas adults reason easily and automatically about social hierarchies (Zitek & Tiedens, 2012; Van Berkel et al., 2015), thinking about equality takes greater effort (Van Berkel et al., 2015). For example, when told to think quickly (vs. carefully), adults allocated significantly more resources to high-status (vs. low-status) groups (Van Berkel et al., 2015). Often, perpetuating group-based hierarchies involves simply going along with an existing societal system, whereas challenging the status quo requires effort and an explicit awareness of inequities between groups.

Open questions concern whether and how children's rectification of group-based inequities in experimental settings translates into real-world action, particularly when children's own group is advantaged or when the presence of inequity may be less tangible. Indeed, whereas preschool-age children in one study rectified a resource inequality they were *explicitly* aware of, children tended to perpetuate the inequality after time had passed and the resource inequality was no longer visible (Li et al., 2014).

Individual differences in support for hierarchy

A third factor shaping children's responses to group-based hierarchies is the extent to which children—and their parents—view social hierarchy as desirable (i.e., social dominance orientation (SDO), e.g., Kteily et al., 2011; Kteily et al., 2017; Sibley & Duckitt, 2010). By adulthood, the more people view hierarchies as the natural ordering of the world, the less they tend to support efforts aimed at rectifying group-based inequities (e.g., Kteily et al., 2011; Swencionis et al., 2021; Hudson et al., 2019). For years, researchers largely assumed individual differences in SDO appear only in early adulthood (for review and discussion see [105]). (Reifen-Tagar & Saguy, 2021). However, in recent years, developmental research has uncovered

expressions of individual-level variation in support for group-based hierarchies much earlier in life (Guidetti et al., 2017, 2021; Reifen Tagar et al., 2017; Reifen-Tagar & Saguy, 2021; Ruffman et al., 2020).

In one study (Reifen-Tagar et al., 2017), 4–5-year-old children watched an ingroup member withhold a scarce resource from an outgroup member. Later, when asked to distribute resources between the ingroup and outgroup characters, children's allocations depended on their parents' SDO: Whereas children whose parents reported *low* support for hierarchy tended to penalize the ingroup character (by allocating more resources to the outgroup character), children whose parents reported *high* support for hierarchy tended not to do so (Reifen-Tagar et al., 2017). In another study, 3–11-year-old White children in Italy whose mothers reported low (vs. high) SDO were more disapproving of ingroup members that favored White over Black characters in their resource allocations (Guidetti et al., 2021; see also Guidetti et al., 2017).

Myriad questions remain unanswered regarding the emergence and development of SDO and related ideologies (e.g., system justification, authoritarian values), and ongoing efforts are focused on developing measures of these ideologies in young children (rather than using measures from parents) (e.g., Ruffman et al., 2020). Better understanding the development of sociopolitical worldviews during childhood, and the contexts under which children's worldviews align with or diverge from those of their parents, are critical avenues for future inquiry.

Children's own social standing

A fourth factor shaping whether and how children respond to group-based hierarchies is children's own social standing, with children from groups with more (vs. less) wealth, power, and status tending to be less likely to challenge group-based inequalities or social exclusion (Burkholder et al., 2020; Cooley et al., 2019; Kirkland et al., 2021; McGuire, Elenbaas, et al.,

2019; Peretz-Lange et al., 2022; Rizzo & Killen, 2020). For example, there is evidence that White children evaluate interracial exclusion as less wrong than do Black children (Cooley et al., 2019), and that children who self-identify as higher-wealth evaluate inter-wealth exclusion as less wrong than do children who self-identify as lower-wealth (Burkholder et al., 2020). Indeed, even experimentally assigning children to a group that is advantaged (vs. disadvantaged) by a resource inequality results in children being less likely to rectify the inequality and more likely to view it as fair (Rizzo & Killen, 2020).

Children who are advantaged by group-based social rank asymmetries may struggle to take the perspective of those who are disadvantaged by group-based hierarchies or to appreciate their own advantage (i.e., privilege). Indeed, children experimentally assigned to a higher-status group show reduced ability to consider others' mental states compared to children assigned to a lower-status group (Rizzo & Killen, 2018). It is an open question whether perspective-taking may help explain the relation between children's social standing and their likelihood of challenging group-based hierarchies. However, providing indirect evidence for this possibility, recent research suggests links between children's perspective-taking skills and their likelihood of correcting self-benefitting resource distributions (Heck et al., 2018) and between children's sympathy and their reactions toward exclusion of lower-income peers (Dys et al., 2019).

As children grow into adolescents, and later adults, there are many ways beyond the scope of this paper—and early childhood—that people can respond to group-based hierarchies (e.g., see Aldana et al., 2019 on anti-racism in adolescents). However, early-life tendencies to perpetuate group-based hierarchies and to link them to inherent causes illuminate ways of thinking that may be particularly intuitive across the lifespan and underscore the importance of

understanding structural frameworks and developing skills like perspective-taking in efforts to rectify uneven distributions of wealth, power, and status across social groups.

Children's thinking about their own social rank

Closely related questions involve children's *thinking* about their own social standing. By adulthood, *subjective* perceptions of one's own social rank predict physical and psychological health, in some cases even more so than do *objective* measures of social rank (e.g., income, education) (e.g., Cundiff & Matthews, 2017; Tan et al., 2020). Such findings with adults raise important questions about how young children begin to conceptualize their *own* social standing. Presumably, children's developing thinking about group-based hierarchies impacts not only how children think about others but also how children think about themselves.

Recent research with young children has begun borrowing tools from research with adults to investigate how children incorporate thinking about social rank into their perceptions of themselves and their own future lives. One measure used extensively with adults involves showing participants a ladder described as representing where people stand in society (i.e., with respect to income, education, and employment) and asking participants to indicate where on the ladder they view themselves (e.g., Tan et al., 2020). Interestingly, when shown a similar ladder measure, preschool-age children tend to view themselves positively, placing themselves at the top of the ladder (Amir et al., 2019; Mandalaywala et al., 2020; Peretz-Lange et al., 2022), with no evidence that children's gender or race influence their responses (Mandalaywala et al., 2020). However, with age, children's placement of themselves significantly declines (Chen et al., 2019; Amir et al., 2019; Peretz-Lange et al., 2022), with some children's placement of themselves declining more than others: By the later elementary school years, children's placement of themselves on these ladder measures correlates with family income and parent education

(Burkholder et al., 2020; Mistry et al., 2015). Thus, children begin holding explicit conceptions of their *own* social rank during early childhood. Yet, children's thinking about their own social rank seems to develop more gradually relative to their thinking about other people.

Recent research on children's leadership cognition reveals a similar disconnect between children's predictions of *others'* social rank and their thinking about themselves. For example, whereas 5–10-year-old children in India selected White and lighter-skinned South Asian students when asked to predict who had been chosen as a classroom president, boys and girls were equally likely to want to be class president themselves (Santhanagopalan et al., 2022; for related findings, see Patterson et al., 2019; Mandalaywala & Rhodes, 2020). Important questions concern the processes through which children's thinking about group-based hierarchies comes to inform children's thinking about their own social rank, and much remains unknown about the roles of children's group memberships (e.g., gender, race, nationality) and early-life experiences in these processes. A better understanding of when and how children place themselves in the group-based hierarchies about which they learn—and what implications this thinking holds—is an important area for continued inquiry.

Concluding remarks

Children begin recognizing, representing, and thinking about group-based social hierarchies early in life. Across early childhood, children's predictions of who is likely to hold greater wealth, power, and status increasingly reveal learning from real-world inequities across groups. Learning about group-based hierarchies occurs through many inputs, including children's own observations and their learning from other people. Children not only learn about group-based hierarchies but become actively involved in these social structures.

An understanding of people's earliest thinking about group-based hierarchies provides a lens into the bridge between societal systems and individuals' representations of them. Continued efforts to understand early-life thinking about, and responses to, group-based hierarchies (see Table 4.2) will continue to provide insight into how people become active participants in the social world—either sustaining group-based hierarchies or taking action to change them.

Table 4.2

Outstanding questions

Question
Are different aspects of social rank (wealth, power, status) differentially salient in children's thinking about different group-based hierarchies? Related questions include whether children view various aspects of social rank as correlated (e.g., that a group with high wealth will also hold power or status).
What do children think about group-based hierarchies at the intersection of two or more social categories? Existing research has largely examined children's thinking about social rank with respect to a single social category, yet people's many group memberships interact to shape their identities and experiences.
How do children integrate the many cues to group-based hierarchies to which they are exposed? Researchers often isolate single mechanisms of learning, but in the world, children are exposed to many cues to group-based hierarchies simultaneously. Related questions include whether some inputs outweigh others.
How do children reason about cases in which different cues to group-based hierarchies match vs. mismatch? Different cues may point to the same or different conclusions, and critical questions involve how these matches vs. mismatches inform children's thinking.

Table 4.2 (cont.)

Do children view social hierarchies as dynamic? Group-based hierarchies—and individuals' positions in them—can shift over time. How do children think about these changes?
What role do other developments play in children's thinking about group-based hierarchies? Future research may continue considering the roles of perspective taking, empathy, and other abilities in children's thinking about and responses to social hierarchies.
How do individual differences in children's responses to group-based hierarchies develop? Open questions include what factors predict the development of explicit questioning of group-based hierarchies (e.g., anti-racism, anti-sexism) and what strategies are most effective in dissuading children from stereotyping individuals based on group-based hierarchies.

Note. Outstanding questions relevant to continued efforts to study children's thinking about societal hierarchies.

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