Developing a Concept of Social Power Relationships

by

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Abstract

Power differences organize social relations across species. They emerge early in development, and are observed in children's early relationships with peers and adults. Despite the ubiquity of social power relations, little is known about how children conceptualize them. This dissertation provides an experimental examination of children's developing understanding of social power relationships between individuals, and among members of social groups.

In Part I, Studies 1, 2, and 3 provide an extensive investigation of 3- to 9-year-old children's and adults' sensitivity to interpersonal social power relations across five manifestations of power: resource control, goal achievement, permission, giving orders, and setting norms. These studies examine children's understanding of power both in situations where the powerful individual may be perceived as unkind (Studies 1 and 2), and in situations where the powerful individual may be perceived as benevolent (Study 3). Findings reveal that children as young as 3 or 4 years old represent social power relations between individuals across several dimensions of power, when presented with powerful individuals who were malevolent as well as benevolent. As predicted, sensitivity to social power in resource control, goal achievement, and permission situations emerges earlier in development. With age, children's sensitivity extends over all five of the dimensions tested, becoming almost adult-like by age 7 to 9.

Part II of the dissertation examines children's sensitivity to power relations between members of social categories. Participants are shown vignettes depicting two individuals contrasting in power, and are asked to identify the relative age (Study 4) or gender (Study 5) of

the individuals. Findings indicate that young children are more likely to infer relative age than gender based on power differentials, and that even adults do not consistently map power onto these social categories.

Overall, this dissertation provides one of the first in-depth experimental examinations of children's developing concepts of social power. The findings show that children are sensitive to social power relations early on, and even use these power relations to make inferences about people's social group memberships.

Chapter 1

Introduction

"[T]he fundamental concept in social science is Power, in the same sense that Energy is the fundamental concept in physics…The laws of social dynamics are laws which can only be stated in terms of power." (Russell, 1938, p. 12-13)[*]

Children are born into systems of social relations characterized by power hierarchies. In the family, power dynamics shape relationships between two parents, between parents and children, and among siblings. At school, children are exposed to rules and power hierarchies, with teachers and principals formally identified as those who are in charge. Children's peer relationships involve intricate power relations, where even play is structured by dynamics between those who lead and those who follow. Power also characterizes dynamics between and within social groups, including those based on gender, race, and social status - concepts that children develop and use from an early age. The ubiquity of power in social relationships, both at the individual and group level, implies that developing an understanding of social power is crucial for children to successfully navigate the social world. Having a concept of power early on would allow children to recognize relational dynamics, gain understanding of behaviors culturally appropriate for different situations, predict others' behaviors, and know which social alliances will benefit them. Yet surprisingly little is known about the developmental origins of a concept of social power, its predictors, and its consequences.

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[*] Cited in Guinote & Vescio (2010).

The study of power has a longstanding, interdisciplinary history, spanning a multitude of perspectives. From philosophers to historians and literary theorists, from natural scientists to social scientists, power has been associated with numerous aspects of social life at the level of the individual (e.g., parent-child relationships), the level of social groups (e.g., relationships between majority and minority groups), and the level of institutions (e.g., relationships between the government and the people). Social psychologists have shown that perceptions of social power influence cognitive and social psychological outcomes such as attention, emotion, self-regulation, and social cognition (for a review, Keltner, Gruenfeld, & Anderson, 2003). In addition, social power has been used to explain processes of social discrimination based on factors including gender, race, and political ideology (e.g., Glick & Fiske, 1999; Guinote, Willis, & Martelotta, 2010; Ho, Sidanius, Cuddy, & Banaji, 2013; Jost & Banaji, 1994; Sidanius & Pratto, 1999; Vescio, Gervais, Heidenreich, & Snyder, 2006;). However, there is often little communication between these various fields of study, and therefore there is no unified definition of social power. Moreover, there is a dearth of understanding in developmental psychology as to how humans develop a concept of power. The studies in this dissertation provide an in-depth, experimental examination of children's and adults' concepts of social power relations between individuals, as well as between members of different social categories.

Origins of conceptualizing social power

An individual's social world is vast, complex, and dynamic. Being able to accurately represent and successfully navigate their large number of interrelated and changing social ties is an important and seemingly difficult task for developing children. Evolutionary psychologists suggest that humans have developed cognitive adaptations that allow them to conceptualize social relations (Cosmides & Tooby, 1992). Studies of nonhuman primates indicate that the

primate brain has grown and evolved for the mapping of a dynamic social world, including the tracking of grooming networks, kinship relations, coalitions, transitive and third-party relations, and quality of relationships with allies and enemies (for a review see Silk, 2007). The adaptive advantage of such social mappings is to maximize access to limited resources, and thus aid survival (Hawley, 1999; Silk, 2007). Across species, recognizing social power allows individuals to build alliances with powerful others, increasing cooperation and in turn, dominance, leading to superior reproductive success (Barton & Whiten, 1993; de Waal & de Waal, 2007; Moll & Tomasello, 2007). Thus, the early-emerging ability for humans to track their social network and the relationships within it carries vital importance.

Similarly, human infants may be born with cognitive biases allowing them to recognize social power differentials early on. Such an expectation is in line with core cognition theories of conceptual development, which suggest that understanding of social relations emerges from innate primitives (Thomsen & Carey, 2013). Recent research in preverbal infants' concepts of social dominance provides support for this argument. Thomsen, Frankenhuis, Ingold-Smith, and Carey (2011) presented 8- to 13-month-old infants an animated scene where two agentic blocks differing in size were depicted as having conflicting goals (i.e., moving towards each other from opposite directions). Based on findings suggesting that larger physical size (Carney, Cuddy, & Yap, 2010; Stulp, Buunk, Verhulst, & Pollet, 2012; Marsh, Henry, Schechter, & Blair, 2009; Re et al., 2012; Schubert, Waldzus, & Seibt, 2008; Smith & Galinsky, 2010; Yap, Mason, & Ames, 2013) and the ability to achieve goals (Guinote, 2007; Hawley, 1999; Slabu & Guinote, 2010) are associated with dominance, in the expected-outcome condition of the study, the smaller block bent over and moved aside to allow the larger block to continue on its path and achieve its goal, whereas in the unexpected-outcome condition, the larger block bent over and moved aside to

allow the smaller block to continue on its path and achieve its goal. Thomsen et al. (2011) found that 10- to 13-month-olds, but not 8-month-olds, looked longer in the unexpected outcome condition, indicating that their expectation of the outcome was violated and that they were surprised by this situation. The authors interpreted this finding as an indication of children's early disposition to represent social dominance, where infants expect a correlation between an agent's size and dominance.

This expectation is consistent with findings showing that physical size is tightly linked to adult humans', as well as adult nonhuman primates', perceptions of social power (Keating, 1985). Studies with adults have shown not only that taller people are perceived as having more authority (Stulp et al., 2012; Re et al., 2012), but also that powerful individuals are perceived by others as larger in size (Marsh et al., 2009), and that powerful individuals overestimate their own height (Yap et al., 2013). People respond to dominant, larger postures by assuming more submissive postures (Schubert et al., 2008), and adults who are primed to assume a more open and upright posture feel more confident, are willing to take more risks, and experience increased testosterone (Carney et al., 2010). According to evolutionary theories and the core cognition framework of development (Thomsen & Carey, 2013), these findings suggest that the relationship between size and power may be a literal expectation and not simply a cultural metaphor, and further that this association may be a readily accessible cognitive representation.

A recent study by Brey and Shutts (2015) found that preschool- and kindergarten-age children may show sensitivity to other nonverbal cues to social dominance as well. Three- to six-year-old participants were shown brief videos of two people sitting across from each other, with one displaying several nonverbal bodily cues of higher power (e.g., erect and open posture, upper head orientation) and the other displaying corresponding bodily cues of low power. When asked

to identify the person in charge, 5- to 6-year-olds, but not 3- to 4-year-olds, successfully identified the person in charge based on the nonverbal cues. Similarly, when shown static photos of two people standing facing each other, 5- and 6-year-olds, but not 3- and 4-year-olds, selected the more upright vs. slouching person, the person with downward head orientation vs. upward head orientation, and the person with direct vs. averted gaze orientation as the person in charge. Finally, in a study by Charafeddine et al. (in press), French 3- to 5-year-olds were presented with two puppets engaged in a physical fight over two episodes, with the same puppet winning on both instances. When asked "Who is the boss?/C'est qui le chef?", participants selected the puppet that prevailed.

Thomsen et al.'s (2011), Brey and Shutts' (2015), and Charafeddine et al.'s (in press) findings are consistent with extensive research examining adults across cultures (Schubert, Waldzus, & Seibt, 2008), as well as nonhuman primates, indicating sensitivity to nonverbal cues to social power (for reviews see Hall, Coats, & LeBeau, 2005; Schubert, Waldzus, & Seibt, 2008). Thus, the developmental, cross-cultural, and inter-species prevalence of specific nonverbal cues to social power may be taken as evidence for early cognitive adaptations that allow for the instantaneous recognition of social power. Indeed, there is neuroscientific evidence suggesting that people's recognition of power is instantaneous: Chiao et al. (2008) found that adult participants were able to detect dominant and submissive faces within 200 milliseconds, and that these faces activated specific parts of the brain (namely, midsuperior temporal sulcus, lingual gyrus, and fusiform gyrus). However, the tasks used in studies with infants demonstrating early sensitivity to social power may be tasks that require only implicit processing of perceptual cues (e.g., relative sizes of the agentic blocks) as opposed to measures of how children reason about power on a more explicit and reflective level. Several researchers have argued for dual

representational systems in conceptual development, where different levels of understanding are attributed to children in infancy and in later childhood (e.g., Mandler, 1988; Wellman & Gelman, 1992). Thus, there is reason to examine children's concepts of social power relationships on a more explicit and inferential level of processing.

Social power as a relational concept

The studies described until now have focused on children's and adults' abilities to detect personal physical traits (e.g., size, posture, strength) that lead to perceptions of power. In addition to physical cues, research has shown that one's personality, temperament, and motivational attributes can also signal dominance (Keltner, Gruenfeld, Galinsky, & Kraus, 2010). Perceptions of social power have been found to influence cognitive and social psychological outcomes such as attention, emotion, self-regulation, and social cognition (for a review, Keltner, et al., 2003). Whereas such individual traits may be important in determining one's power, they are not sufficient to create a *power relationship*. Social power relations are defined as the asymmetries between two actors in their relative ability to exert power (for ends such as resource acquisition, goal achievement, and so on) over others (Fiske, 2010; Hawley, 1999; Overbeck, 2010; Sidanius & Pratto, 1999). Therefore, it is important to understand how children conceptualize social power within interpersonal relationships. Early studies of children's peer group relations have shown that children form clear dominance hierarchies from a young age. Parallel to findings from cross-species studies, toddlers and preschoolers who are dominant in their peer groups have been found to attract attention, be imitated and followed, and achieve their goals in conflict situations (for a review, Hawley, 1999). So, although children display adult-like dominance behaviors, the way(s) in which they think about the power relations in such dominance hierarchies is virtually unexplored.

Using a similar looking-time paradigm as Thomsen et al.'s (2011), Mascaro and Csibra (2012) found that 15-month-old infants expect a dominant agent to remain dominant across different conflicts between the same two agents. Moreover, they suggested that infants not only represent social dominance early on, but that they perceive social dominance as a relational factor between two agents rather than the trait of an individual. Thus, when presented with the dominant character from the first trial interacting with a novel character in a subsequent trial, infants did not readily expect the same agent to remain dominant in the new relationship. As further evidence, Mascaro and Csibra (2014) also showed that 15-month-old infants were able to make transitive inferences of power relations between four agents when the dyadic relations were presented in continuous order (i.e., A > B, B > C, C >D), but not when they were presented in discontinuous order (i.e., A > B, C > D, B > C).

There is also evidence that young children do not always view social power as a stable trait, but are instead able to judge power within the specific context of the relationship, attributing power flexibly to different people. For example, preschoolers follow instructions from peers who have been identified as authority figures more than from adults not identified as authority figures, but refuse to accept authority in situations where the agent's commands do not prevent harm (Laupa, 1994). Similarly, 2nd to 6th graders do not view their school principal as an authority figure outside school (Laupa & Turiel, 1993). However, it is unclear whether children understand the relational quality of social power that is defined by the attributes unique to the interpersonal relationship (e.g., a mother may have power over her own child, but not necessarily someone else's child; if the mother is also a teacher, she will have power over other children, but the two power relations will be bounded by different constraints). Moreover, children's conception of social power as a predictor of the quality of relationship (e.g., friend or foe)

between two individuals is largely unexplored.

Power and social categorization

Humans live and develop within social groups. Throughout development, individuals within social groups form and maintain numerous social bonds that enable coalitions. Individuals also form relationships with members of other social groups, which may be affiliative or agonistic depending on the groups' relative status and interests (Silk, 2007; Swedell, 2012). From a young age, children view certain social groups as essential and stable, and use social categories (e.g., gender: Rhodes & Gelman, 2009; Taylor & Gelman, 1993; Taylor, Rhodes, & Gelman, 2009; language: Kinzler, Shutts, DeJesus, & Spelke, 2009; Kinzler & Dautel, 2012; race: Hirschfeld, 1996; Rhodes & Gelman, 2009; ethnicity: Birnbaum, Deeb, Segall, Eliyahu, & Diesendruck, 2010; Diesendruck & haLevi, 2006) in making inferences about others' attributes, or predictions about their behaviors. Children form distinct representations of the in-group versus the out-group, viewing those within a group as sharing an inherent, defining essence. Within such an outlook, perceptions of similarity between in-group members, and perceptions of differences between out-group members are heightened (Hirschfeld, 1996; Rhodes, 2012; Tomasello, 2009), with children showing implicit and explicit preferences for their in-group members (Dunham, Baron, & Carey, 2011; but also see Dunham, Chen, & Banaji, 2013; Horwitz, Shutts, & Olson, 2014). For these reasons, researchers have even argued that children treat certain social categories (e.g., gender, language) similar to the way they treat natural kinds (Hirschfeld, 1996; Rothbart & Taylor, 1992). Despite extensive evidence for children's early, well-formed beliefs about the similarities between members of social categories, little is known as to whether children view social categories in terms of power relations.

In a recent paper, Rhodes (2012) suggested that children's concepts of social categorization are guided by two intuitive theories: the essentialist theory that certain social categories are like natural kinds (Hirschfeld, 1996), and the expectation that certain social categories define social obligations. That is, whereas the first intuitive theory allows children to form representations about individuals within social groups (e.g., making similarity judgments about members of a category, and using these judgments to predict nonobvious properties like traits, preferences, future behaviors), the second intuitive theory allows children to conceptualize the ways in which groups of people relate to and treat each other. Importantly, Rhodes (2012, 2013a) drew attention to the shortcomings of research described above, in explaining the function of social categorization as a cognitive heuristic for young children. In addition to marking similarities between individuals that make up a social group, categorization must also define and constrain the ways in which people relate to one another. In support of this theory, Rhodes and Chalik (2013) have shown that 3- to 9-year-old children judge within-group harm as objectively wrong, but between-group harm as contingent on contextual factors, demonstrating that they interpret even a novel category as marking social obligations. Moreover, Chalik and Rhodes (2014) also found that 4-year-olds who were told that an individual from one novel group was harmed by an individual from a second novel group, predicted that other members of the first group would no longer be friends with members of the second group. Thus, children in these two studies showed the ability to successfully track and predict allegiance relationships between members of social groups.

Alliances and coalitions are not the only relational aspects of social groups. Also central to social group interactions are power relations, and for adults, most social categorizations are characterized by power. Examples include age group (adults generally have more power than

children), gender (males often have more power than females or transgender people), social class (there are often clear power differences between those of upper and lower social class, generally based on relative wealth), race (e.g., in the United States, White people often have more power than other racial groups), language (native language speakers overall are evaluated more highly on several attributes than accented speakers), caste (in India, people of Brahmin origin historically tend to be more powerful than people of other caste origins), and numerous others across the world. Moreover, for many evolutionary and comparative psychologists, alliances are considered a major part of power relations, where individuals use alliances and prosocial strategies to achieve their desires and needs (Hawley, 1999; Silk, 2007).

To attain a complete understanding of children's ability to use social categories as a means of predicting social obligations, it is important to study the developmental trajectory of construing social power in terms of social category relations. Little work has examined this question directly, although indirect evidence may be gleaned from the existing literature. Studies of children's implicit and explicit beliefs about social categories have suggested that children may expect that members of different social categories have jobs of differing social status (Bigler, Averhart, & Liben, 2003; Liben, Bigler, & Krogh, 2001), and that children may show in-group preferences when they belong to a high-status social group, but out-group preferences when they belong to a low-status social group (Dunham, Chen, & Banaji, 2013; Horwitz, Shutts, & Olson, 2014). Thus, children may represent members of social categories as belonging to relatively different power statuses. Yet, children's construal of social power in regulating social group relationships is still largely unexplored.

The present studies

The studies presented in this dissertation were designed to examine children's and adults' concepts of social power relations between individuals as well as members of social categories (age and gender). Moreover, due to the complexity and multi-dimensionality of power as a concept, the studies presented here aim to examine children's understanding of social power across a variety of the different ways in which it may be manifested.

The present dissertation consists of two parts. Part I examines children's and adults' sensitivity to five possible manifestations of power relations between two individuals (Studies 1 and 2). The five dimensions used in the studies (resource control, goal achievement, permission, giving orders, setting norms) are described in detail in Chapter 2. Additionally, because many of these manifestations involve behavior that is relatively unkind (e.g., ordering someone to do something; denying permission), Study 3 investigates whether children's concepts of power extend over situations where the powerful character is benevolent, in order to understand to extent of their early concepts of social power, as well as provide a control for Studies 1 and 2.

In Part II of the dissertation, using the same dimensions identified in Part I, I examine whether and how children and adults map similar social power relations onto social category membership (i.e., whether they expect older children to be more powerful than younger children, or boys to be more powerful than girls). Specifically, participants are provided with similar manifestations of social power relations between two individuals, and are asked to make judgments regarding agents' relative ages (Study 4) and genders (Study 5).

Across all five studies, I map the development of the concept of social power as a predictor of inter-individual and inter-group relations. For this purpose, participants recruited were 3- to 9-year-old children and adults. Children of these ages were selected due to our

preexisting knowledge that by 3 or 4 years of age, children begin to represent others' internal mental states, a skill necessary for understanding reciprocal relations (Wellman & Miller, 2006), and that they have clear representations of social categorizations based on age and gender (e.g., Taylor & Gelman, 1993). I predicted that children as young as 3 years of age would have early representations of social power relations between individuals as well as members of social groups, but that with age, their understanding of social power would become more nuanced.

Part I

Understanding social power relationships between individuals

Chapter 2

Introduction to Part I

Social power is commonly defined as the ability to compete with others in the access to and control of resources (Hawley, 1999; Sidanius & Pratto, 1999). Yet, as evidenced by the numerous conceptualizations used by researchers in various fields of study (for reviews, Göhler, 2009; Guinote & Vescio, 2010), limiting the definition of power to control of resources may not sufficiently express the scope of the concept. In fact, it is possible to construe even resource control in several ways. One may have power to access resources, or one may have power to control resources. Whereas access to resources requires one's ability to compete for the resources themselves, control over resources requires the ability to compete for decision-making and distribution power. Moreover, social power can be construed in terms of power *to* accomplish goals or power *over* others, independent of resource control; the former refers to the ability to carry out certain actions to achieve a desired outcome, and the latter refers to the ability to control others' actions to achieve desired outcomes (Cummins, 2006; Göhler, 2009). Thus, it is important for a study of children's developing power concepts to consider the breadth of this complex concept.

The few studies that have studied children's conceptualization of social power have not differentiated between the possible ways of construing power. For example, in Thomsen et al.'s

(2011) study, 8- to 13-month-old infants were presented with a scene in which two animated squares differing in size were moving toward each other from opposite directions. When the squares met in the middle, they bumped into each other, indicating that one of them had to move out of the way for the other to be able to pass. The authors found that 10- to 13-month-old infants looked longer at the unexpected outcome condition (the larger agent bowing down and moving out of the way for the smaller agent) than the expected outcome condition (the smaller agent bowing down and moving out of the way for the larger agent), and concluded that infants represent social dominance relations early on. This study demonstrated that infants expect that larger agents will achieve their goals. Mascaro and Csibra (2012) added that preverbal infants represent social dominance as a stable relationship between two individuals. They presented infants with an animated blue circle and an animated red triangle; when one resource dropped onto the scene in the middle of the two agents, both agents approached the resource but only the blue circle took it. After observing this, infants were shown another scene with a similar resource struggle with again the blue circle prevailing (expected), or the red triangle prevailing instead (unexpected). Mascaro and Csibra (2012) found that infants looked longer at the unexpected condition, and argued that this shows that infants expect the power relation between two individuals to be consistent and stable across different examples of similar power struggles (e.g., resource control). In a subsequent study, Mascaro & Csibra (2014) also demonstrated that 15 month-old infants can represent hierarchical relationships between multiple agents, as long as the relations are shown in incremental order. Together, these studies provide converging evidence for an early sensitivity to social dominance differentials as demonstrated by differences in height, ability to achieve goals, and access to resources, suggesting that human infants may have early developing cognitive representations that allow them to understand social dominance relations.

Again, it is important to keep in mind that infant sensitivity to social power relations may be at a more implicit level of representation, compared to later, more explicit representations.

Others have examined preschoolers' sensitivity to social power. As noted earlier, Brey and Shutts (2015) found that 5- to 6-year-olds (but not younger children) show adult-like sensitivity to nonverbal cues to social power (e.g., upright posture, raised gaze). Interestingly, they found that 3- and 4-year-olds were unable to consistently identify the person in charge when only static, nonverbal cues to power were presented. The authors suggested that young children may not readily map nonverbal cues onto social power, or that they may attend to nonverbal cues other than those used in the study (e.g., they may attend to differences in height like in Thomsen et al., 2011). Charafeddine et al. (in press) presented 3- to 5-year-old children in France four scenarios that cued different dimensions of power, using two identical puppets: physical supremacy, decision making (i.e., winning a verbal argument), age asymmetry, and resource asymmetry or wealth. In each scenario, participants are asked, "Who is the boss?" Children correctly identified the dominant character as the boss for all the dimensions. Although this study provides intriguing initial evidence for children's early attention to dimensions of power, the work has several interpretive limitations. First, two of the four vignettes (physical supremacy and age) arguably tap into physical power differentials (including strength, aggression, and size) rather than manifestations of social power. Whereas physical supremacy is certainly a prominent feature of what makes someone powerful in the most literal sense, it tends not to be central to most social interactions past a certain age. Indeed, Hawley (1999) argues that by preadolescence, children will stop viewing physical strength as an acceptable means of social interaction, and calls for a research program that takes developmental changes in conceptualizing power into consideration. Second, two of the vignettes (resource asymmetry and age) entail static features of

the characters rather than describing a social interaction between the characters, and thus again do not tap into interpersonal power relations. Thus, there is still a dearth of understanding of when children begin to make inferences about power in interpersonal interactions, as well as how perceptions of interpersonal power develop.

The present Studies 1 and 2 are among the first studies to address these issues. Specifically, these studies are designed to advance our understanding of children's concepts of social power in three ways. First, participants were presented with several vignettes taking place between two individuals, depicting a variety of ways in which power may be manifested. Second, participants ranging in age from early preschool through elementary school and adults were recruited, in order to map out the developmental trajectory of social power concepts. Third, participants' concepts of power were assessed in situations where the powerful character could be conceived as either malevolent or benevolent, both to ensure that the task assessed power per se (and not just "niceness" or "meanness"), and to determine whether there are developmental changes in understanding positive versus negative manifestations of power.

In the remainder of this chapter, I first describe the five manifestations of power selected for the research. Then, I provide an overview of the studies in this section.

Manifestations of social power

The dimensions used for the studies described in this dissertation were selected based on three common ways in which social power has been defined in the literature: the ability to control resources, the ability to achieve intended goals, and the ability to control one's own and others' outcomes. Derived from these conceptually distinct definitions used in the literature, I propose a subset of five separable dimensions of power in both inter-individual and inter-group relations,: resource control, goal achievement, permission, giving orders, and setting norms.

Because the third common definition, the ability to control outcomes, is rather broad in scope, I decided to oversample this through the use of three dimensions: permission, giving orders, and setting norms. These dimensions of social power are neither exhaustive nor conclusive. Rather, I have selected them to represent a range of manifestations of social power that are hypothesized to have implications for children as well as adults. Presumably, there are other ways in which power may be manifested that are not included in these studies, and children may be sensitive to those as well.

Resource control. One's access to or control over resources is central to the way in which social power is construed across disciplines. According to the evolutionary perspective, social power is the ability to compete for resources, which includes both the amount of resources that one is able to control as well as the ability to decide the fate of others' access to resources (Hawley, 1999). From this point of view, individuals who are able to seek out allegiances with those who can access and control resources have better chances of survival. According to Guinote and Vescio's (2010) definition, resource control lies at the foundation of interpersonal relationships (both at the individual and group level), where power differentials occur when one party possesses a disproportionate amount of valued resources (physical, social, or economic). Thus, recognizing who has the ability to access wealth and control of resources is an important developmental task.

Resources vary considerably, from concrete items such as food or clothing to abstract resources such as love, attention, play partners, and cognitive stimulation – all tightly related to development. The developmental literature is rich with evidence for children's early awareness of the normative value of concrete and abstract resources, demonstrated through children's beliefs about ownership and property rights. By the time they are 2 years old, children represent

ownership as a concept separate from possession (Friedman & Neary, 2008); by age 3, children think that owners of an object are entitled to decide who gets to use the object (Neary, Friedman, & Burnstein, 2009), and they are able to distinguish liking of an object from ownership (Noles & Gelman, 2014). Six- to 8-year-old children even apply the same ownership principles to abstract resources, and determine ownership of ideas by tracking who came up with the idea first (Shaw, Li, & Olson, 2012).

Moreover, young children develop beliefs about the right ways of allocating resources. Infants as young as 18 months of age share excess resources with adults who show desire for the resources, and 24-month-olds share without any prompting (Brownell, Iesue, Nichols, & Svetlova, 2013). Across numerous studies, preschoolers have been shown to prefer equal distribution of resources (e.g., LoBue, Nishida, Chiong, DeLoache, & Haidt, 2011; Olson & Spelke, 2008). In fact, children's principles about fairness can be rather strict, to the extent that six- to 8-year-old children will opt for the experimenter to throw away a resource rather than distribute resources unequally (Shaw & Olson, 2012), and will disregard gender information in their allocations (Gülgöz & Gelman, unpublished work). There is also evidence, however, for children's self-interested biases, where they will tend to share fairly only if there is no cost to themselves. For example, although 3- to 8-year-old children will state that they should share equally with others, when presented with a chance to share their resources, they will choose to allocate more resources to themselves until around age 7 (Smith, Blake, & Harris, 2013). Moreover, although 3-year-olds share resources equally, they do so more often with collaborative partners than with freeloaders (Melis, Altrichter, & Tomasello, 2013; Warneken, Lohse, Melis, & Tomasello, 2011), and choose to distribute more resources to a target puppet's sisters or friends than a stranger (Olson & Spelke, 2008). Four- and 5-year-olds keep track of

others' resources and try to minimize inequality between two individuals, despite showing more positive affect toward the individual who had more resources to begin with (Li, Spitzer, & Olson, 2014).

Together these findings imply that young children's beliefs regarding resource allocation, as a relational dimension between individuals, may be more nuanced than initially thought. In the studies described above, children not only make moral judgments (i.e., deciding who to share with and how to divide resources), but they also attribute valence to all kinds of resources and their ownership. For example, the 4- to 5-year-olds in Li et al.'s (2014) study showed preference for those who have more resources, even in the absence of any indication that they themselves would benefit from these resources. This sort of behavior is in line with evolutionary claims that it is an adaptive trait for individuals to be attracted to those with higher power and higher access to resources (Hawley, 1999). Thus, given their early awareness of the value and social meaning of resources, children may also infer social power relations by observing the way in which objects are handled between two interacting individuals, as well as members of social groups.

Goal achievement. Power hierarchies become particularly apparent in situations where there are contradicting goals, where those who have more power than their competing counterparts are more likely to attain their goals (Guinote, 2007; Thomsen et al., 2011). In the most basic sense, social power refers to the ability of an individual or group to achieve their intended goals, at the expense of others' goal achievement (Guinote & Vescio, 2010; also see Russell, 1938). In this sense, social power is the ability to control the outcome of a certain situation, often in the face of resistance (Dahl, 1957; Fiske, 1993; Keltner et al., 2003). Consistent with this idea, adults who are more powerful are more goal-oriented and less inhibited in their actions, and thus more likely to overcome opposition (Keltner et al., 2003; Guinote,

2007). Previous research shows children's early understanding of goal-directed and intentional action (for reviews, Wellman & Miller, 2006; Wellman & Woolley, 1990). However, we know little about children's expectations when individuals' intentional actions conflict.

At the basis of understanding conflicting goals, similar to understanding goal-directed action, lies Theory of Mind (ToM) development, including one's ability to represent others' internal beliefs, desires, and emotions (Wellman & Liu, 2004). For a child to interpret a goal achievement situation in terms of a power relation, the child has to first understand that there was a common goal desired by multiple agents, but that the outcome of one agent attaining that goal necessitates the others' failure to achieve their own goals. Studies with infants show that even 8-month-olds represent intentional actions, and that 10-month-olds represent failed goal-directed actions (Brandone & Wellman, 2009; Wellman & Brandone, 2009). By 2 years of age, children understand how a person's goals affect their emotional state (Wellman & Woolley, 1990), and by 4-5 years of age, children attribute feelings of sadness to moral transgressors whose attempts to victimize others were prevented (Arsenio & Kramer, 1992; Lagattuta, 2005). Although preschoolers correctly predict others' goal directed actions, this ability is diminished when they are asked to make judgments about conflicting goals situations. When asked to predict others' behaviors when their desires are shown to be conflicting with the child's own desires, 5- to 7-year-olds and adults, but not 3- to 4-year-olds, are able to correctly predict the behavior (Atance, Bélanger, & Meltzoff, 2010; Moore et al., 1995; Wright Cassidy et al., 2005). However, when 3-year-olds are asked about two other individuals' conflicting goals, they accurately identify the happy and sad targets based on whose desires were fulfilled in the end (Rakoczy, Warneken, & Tomasello, 2007). Thus, preschoolers may represent conflicting goals as long as their own goals are not compromised, and understand the emotional consequences of whether goals are achieved

or not. However, it is unclear from these studies whether young children who understand that two individuals' conflicting goals will lead to negative feelings in the one whose goals are not fulfilled, will also understand that this asymmetry in the ability to achieve goals reflects power differentials.

Permission. Aside from having control over resources and the ability to achieve goals, having social power involves the ability to control others' outcomes and the ability to lead others toward a particular desired goal (for a review, Fiske & Berdahl, 2007). Along these lines, French and Raven (1959) define social power as the "potential to influence others in psychologically meaningful ways" (cited in Guinote & Vescio, 2010, p. 2), and Fiske (1993) and Keltner et al. (2003) suggest that such influence occurs through rewards and punishments. Permission is one such dimension.

For young children to represent power relations between two people, representing the agents' mental states (ToM) may not be sufficient. In addition, children have to understand the social context in which the agents' mental states interact. Thus, understanding social power relations may necessitate deontic reasoning, that is, the understanding of social rules governing obligations, permissions, and prohibitions (Dack & Astington, 2011). Evolutionary theorists argue that deontic reasoning is an innate adaptation that allows one to detect those who violate social contracts (Cosmides & Tooby, 2008) and to detect and navigate social dominance hierarchies (Cummins, 1996a).

Young children experience these aspects of power early on, as they are often told what to do by parents and teachers and require their permission for a number of daily activities. Children as young as 3 years of age understand social obligations and permissions (e.g., Cummins, 1996b; Dack & Astington, 2011; also see Wellman & Miller, 2008), and even preschoolers make

inferences about a person based on whether they give or deny permission. For example, Neary, Friedman, and Burnstein (2012) found that, when preschoolers are asked to infer ownership of an object, older 3-year-olds and 4-year-olds choose based on who gives or denies permission for the use of the object; 6- to 8-year-olds use these same principles in determining ownership of ideas (Shaw, Li, & Olson, 2012). Thus, given children's early understanding of deontic relations and the tight conceptual tie of deontic relations with social power relations, it is expected that children from a young age will represent social power in terms of permission.

Giving orders. Giving orders refers to a division of labor among people by one person who has the authority to do so. Although nonhuman primates may display some form of division of labor (e.g., recruiting partners to collaborate for a mutual goal, Melis, Hare, & Tomasello, 2006), the use of giving orders to elicit leadership and followers is uniquely human (for a review, King, Johnson, & Van Vugt, 2009). One person giving orders to another results in the explicit statement of social obligations and thus has social consequences. For an individual to follow another's orders, it is important that they accept the power of the person they will follow a priori. Laupa (1994) showed that preschoolers and 7- to 11-year-olds follow orders of both peers and adults when both are presented as authority figures. These findings were also replicated with Korean children (Kim, 1998; Kim & Turiel, 1996), showing children's tendency to accept assigned authority irrespective of social position across multiple cultural contexts (e.g., children will accept younger siblings as authority figures if they were assigned the authority by their parents). Together, these findings show children's sensitivity to one's ability to give orders in situations where one is placed in a position of authority. However, it is unclear as to whether children can make the reverse inference of interpreting order giving as a manifestation of power relations between third party individuals.

Setting norms. Social norms refer to often culture- and context-specific rules that govern social interactions. Because of their implications for shared intentionality, social norms are considered to be unique to humans and are believed to be a relatively recent adaptation in human evolution (Rakoczy & Schmidt, 2013). According to Tomasello (2009), despite evidence for some nonhuman species' ToM abilities, humans are the only primates known to use social norms as a means for structuring and organizing group relations. Tomasello (2009) identifies two types of social norms: norms of cooperation, and norms of conformity. Of these two, norms of conformity stress the evolutionary pressures to be similar to others within your group, in time leading to the enhancement of within-group similarities and intergroup differences. According to Hawley (1999), powerful individuals are most likely to be imitated, admired, and sought as allies by others. Although social norms typically do not arise explicitly from one individual, those who start and implement them tend to be those who are in powerful positions. Consider a high school cafeteria with its usual cliques, and imagine a group of popular students wearing a new brand type of hat. It is likely that in a matter of days, not only will this hat become a status symbol, but there will be implications regarding those who wear it and those who do not. The original wearers of the hat would be the norm-setters, and the ones who start wearing them after would be the imitators, or the followers of the norm. However, simply wearing the hat may provide a certain status to the imitator, as those who do not wear the hat may be deemed nonconformists or as not having the prior social standing necessary for acquiring the hat (e.g., wealth).

Developmental evidence supports the importance of imitation in individual and group relations. Chudek, Heller, Birch and Henrich (2012) showed that 3- and 4-year-olds preferred to learn a new action from an adult model that others had previously attended to, than an adult model that others had previously ignored. With these findings, they argued that children used

prestige as a marker for cultural expertise. Over and Carpenter (in press) showed that 5-year-olds use imitative behavior to infer affiliation and relative status in third party relationships. When shown two individuals, one imitating a novel action modeled by the other, and asked which of the two individuals was the boss, five-year-olds identified the person modeling the behavior as the boss, as opposed to the one imitating, and believed that the imitator liked the model. In an earlier study, Over and Carpenter (2009) also found that 5-year-olds primed with videos showing an individual excluded from a group showed higher imitation behavior of an in-group model, compared to children in a control condition. They argued that this behavior showed that the 5-year-olds primed with the exclusion video were motivated to avoid a similar exclusion by modifying their behavior to conform to the group. Finally, McGuigan (2013) showed that 5-year-olds imitated actions modeled by high-status adults more often than those modeled by low-status adults, even when the actions were irrelevant to the intention. Together, these findings suggest that children are sensitive to imitation in third-party relations, and are able to use these relations to infer dominance and group norms.

Overview

Part I of this dissertation consists of three studies with children (ages 3 to 9) and adults (ages 18 to 40) examining concepts of social power by means of vignettes spanning the five dimensions described above. Study 1 recruited 4- to 9-year-old children and adults, and was designed as a preliminary study, where participants were presented with 10 test vignettes that were hypothesized to include aspects of the five dimensions, and two control vignettes (assessing physical power and an irrelevant dimension). In each vignette, there were two characters highly similar in appearance, but contrasting on only the dimension in question. After hearing each vignette, participants were asked, “Who has more power?” and were given the option to respond

by selecting one of the two characters, or stating that they were the same. If participants selected one of the two characters, they were also asked how much more power that character had. The purpose of Study 1 was to understand children's and adults' sensitivity to social power relations across multiple manifestations of power. Moreover, because this was the first extensive study of children's conceptualization of social power relations across a number of different manifestations, it was important to establish a task that accurately measured these concepts and was easily understood even by young preschoolers. The control items were used to gauge participants' understanding of the most basic and literal sense of power.

Results from Study 1 led to modifications of the task for Study 2. In Study 2a, I first pretested with adult participants how well modifications in the vignettes reflected the hypothesized dimensions. Once it was shown that the vignettes accurately reflected the intended dimensions, Study 2b examined children's (3- to 9-year-olds) and adults' concepts of social power by asking them to identify the character in charge for each vignette. Finally, in Study 3, I examined children's and adults' conceptualization of power when the powerful character is benevolent (e.g., shares resources equally), as a comparison to Studies 1 and 2, in which the powerful characters could be interpreted as relatively meaner. Together, the three studies in this section provide a comprehensive examination of children's developing understanding of social power.

Given the lack of in-depth experimental research on children's concepts of social power as a major facet of human relations, the studies presented here are largely exploratory in nature. However, there were still certain important predictions. First, it was expected that sensitivity to power differentials between people would increase with age, as children's social cognitive abilities developed. Second, it was expected that there would be different developmental

trajectories observed for the different dimensions. Although there are clear overlapping aspects of the dimensions of social power listed above, there are also important differences between them.

Whereas the first two dimensions (resource control and goal achievement) relate largely to individual endeavors, the last three (permission, giving order, and setting norms) relate more to dyadic interactions. Furthermore, whereas young children experience power struggles in resource control and goal achievement with their peers on a daily basis, it may be that children begin to experience power struggles in which outcomes are controlled by those other than their caregivers only once they have begun formal schooling. Because parents are caregivers, they assume many roles in a child's life other than being a power figure. In contrast, teachers and principals in schools are parts of formal hierarchies, and thus once children experience permissions, orders, and social norms in these sorts of settings, they might develop clearer concepts of related aspects of social power.

Finally, as mentioned above, there is reason to believe that resource control and goal achievement are earlier adaptations that humans share with nonhuman primates, and that the last three dimensions (those requiring deontic reasoning and advanced ToM capacities) are later adaptations unique to human evolution. Although evolutionary precedence certainly does not necessitate ontological precedence, the increased requirement of advanced social cognitive skills might drive the same order in development.

For these reasons, it was expected that whereas children would be sensitive to resource control and goal achievement dimensions early on, the permission, giving orders, and setting norms dimensions might require more advanced cognitive skills that develop later in childhood.

Chapter 3

Study 1: "Who has more power?"

Study 1 examined children's sensitivity to several possible manifestations of social power. Specifically, participants received a series of vignettes depicting two individuals in a power imbalance, and were asked to identify which character had more power. The purpose of this first study was to ask about power as a general concept that may include a variety of manifestations, as discussed above. Thus, the term "power" was left undefined for participants.

Method

Participants. Participants were 18 4- to 6-year-old children (M = 5.57, range = 4.13 – 6.88 years, 10 females), 18 7- to 9-year-olds (M = 8.10, range = 7.10 – 9.34 years, 12 females), and 27 adults (M = 27.86, range = 19.00 – 40.41 years, 8 females). Child participants were recruited in a local children's museum, whereas adults were recruited online through Amazon Mechanical Turk (MTurk). Adult participants were limited to the United States, determined by IP address. Participation was voluntary for both children and adults. As compensation, children received a small toy, and adults received $0.50. For child participants, parental consent and child verbal assent were provided prior to testing. Adult participants provided consent before participating. Data from one child were dropped because the participant was too young for the determined age groups. The age range for the adult participants was limited to 18-40 years of age, to avoid possible cohort effects in responses. Limiting ages of participants when recruiting through Amazon MTurk is not permitted. Therefore, in order to obtain the desired age range, data from 16 adults (ages 41.85-76.38 years) were collected but not included in the study.

Measures and Procedure. Child and adult participants received the same version of the task using Qualtrics survey software. Participants' sensitivity to different aspects of social power was measured using 10 vignettes, each describing a different situation (see Appendix A for list of vignettes used). In each vignette, participants saw two hand-drawn figures of the same shape and size, which contrasted only in terms of the aspect of power in question, and were asked to decide, "Who has more power? [Name of first character], [name of second character], or are they the same?" (see Appendix B for sample images). If they selected one of the characters as more powerful than the other, participants saw a 5-point Likert scale consisting of circles of increasing size and asked, "How much more power does [selected character] have? A little bit more, a whole lot more, or somewhere in between?" The test vignettes were presented in randomized order. After receiving the test vignettes, participants were given two additional control vignettes, in fixed order. In the first control, the two characters differed on an irrelevant dimension (i.e., whether they drew a triangle or a circle). In the case of the irrelevant dimension, I expected participants to select at chance, or to indicate that the characters were equally powerful. In the second control, two characters differed in terms of physical power (one was able to lift a heavy bowling ball for a longer time than the other). Here, it was expected that participants would select the character that was more physically powerful. This trial was always shown at the very end in order to prevent a physical sense of the term 'power' priming a particular meaning of the concept early on in the task.

The illustrated characters presented in each vignette were similar but distinct in clothing patterns and novel names. For male participants, each character was described as a boy; for female participants, each character was described as a girl. This was done as an added measure to control for any possible pre-existing assumptions about power and gender interfering with

participants' selection of the powerful character. In order to control for possible order effects, the position of the powerful character was counter-balanced across vignettes, such that the powerful character was on the left for five of the vignettes (one from each dimension), and on the right for the other five.

Coding and Analysis. Participants received 1 point for each predicted response (i.e., identifying the predicted powerful character on the test trials and physical control trial), 0 points for each opposite response (i.e., selecting the non-predicted character on the test trials and the physical control trial), and 0.5 points for responding "the same" on any of the trials. For the irrelevant dimension trial, because the predicted response was "the same", the character presented on the left was arbitrarily marked as the "correct" response and participants who selected that character received 1 point, while the opposite character was given 0 points. This allowed analyzing all items on the same scale.

In addition to examining participants' performance on individual vignettes, a composite total score was calculated, summing the total number of test trials (not including the two control trials) on which participants correctly identified the more powerful agent. Thus, the maximum possible score for the composite total was 10 (if a participant selected the 'predicted' character on each test trial), chance level was 5, and the minimum possible score was 0.

The Likert scale data were conditional on the types of responses participants gave in each vignette. First, participants only received the scale if they selected one of the two characters, but not if they responded with 'the same.' Second, participants received the scale for either choice (predicted or opposite). Thus, in order to analyze the Likert scale data on one scale, participants' responses were recoded such that 'the same' responses were recoded with a '0', selecting the more powerful character was recoded with a positive value of the scale response (1

to 5), and selecting the less powerful character was recoded with a negative value of the scale response (-5 to -1).

Results

A univariate analysis of variance was performed, with the composite total score as the dependent variable and age group (4-6 year-olds, 7-9 year-olds, adults) as the independent variable. The results showed a significant effect of age group, $F(2,60) = 28.12$, $p < .001$, $\eta_p^2 = .49$. Post-hoc pairwise comparisons indicated that 4- to 6-year-olds ($M = 5.25$), 7- to 9-year-olds ($M = 6.40$), and adults ($M = 8.50$) all differed significantly from one another (ps $< .01$). Each age group's total score (potentially ranging from 0-10) was also compared to chance (chance level =5) using one-sample *t*-tests. Whereas the youngest children performed at chance ($p = .50$), older children ($p = .001$) and adults ($p < .001$) performed above chance. Consistently, one-sample *t*-test comparisons of the individual vignettes to chance (.5) indicated that the youngest age group performed at chance and adults performed above chance for all vignettes (ps $< .01$). Seven- to 9-year-olds performed significantly above chance on four of the 10 vignettes (Toy Truck, Candy Bar, Dessert, Red T-shirt), but at chance for the rest. Results of chance comparisons of individual vignettes are shown in Table 1.

Next, participants' responses to the Likert questions were analyzed. For this purpose, participants' Likert scores (ranging from -5 to 5) were averaged, thereby producing a composite scale score for all vignettes. For each age group, these composite scores were compared to chance (0). As with the choice data described above, all age groups' performance differed significantly from each other, and was above chance for 7- to 9-year-olds ($p = .002$) and adults ($p < .001$). Likert scale scores are shown in Table 2.

Finally, performance on control items was analyzed as an index of whether participants

understand the task. For each control vignette, separate one-sample t-test comparisons to chance (.5) were conducted. For the physical power condition, younger children (M = 0.86, SD = .33, $t(17) = 4.58$, $p < .001$), older children (M = 0.89, SD = .21, $t(17) = 7.71$, $p < .001$), and adults (M = 0.89, SD = .21, $t(26) = 9.54$, $p < .001$) performed above chance, indicating they selected the character that was able to carry the heavy ball for longer as the more powerful one. For the irrelevant dimension, older children (M = 0.50, SD = .17, $t(18) = 0.00$, $p = 1.00$) and adults (M = 0.50, SD = .00) performed at chance, whereas younger children (M = 0.61, SD = .21, $t(17) = 2.20$, $p = .042$) performed above chance, meaning that they selected the character drawing the triangle as more powerful than the one drawing the circle.

Discussion

In Study 1, 4- to 9-year-old children and adult participants were presented with a series of vignettes describing two individuals contrasting in power, and asked to identify who had more power in each situation. Results show clear developmental patterns in conceptualizing social power. Whereas 4- to 6-year-olds did not show sensitivity to the power differentials described in any of the vignettes, 7- to 9-year-olds showed sensitivity to power differentials in some vignettes but not all. Adults, however, consistently identified the character hypothesized to be more powerful, in all 10 of the test vignettes. Thus, the multi-faceted nature of social power as defined in the social science literature is demonstrated in the results of this study, particularly through the gradual fashion that children seem to conceptualize social power. In other words, the development of social power may be better understood if it is examined as a multi-faceted concept, rather than a single concept that emerges at once. Consistent with the predictions based on comparative studies with nonhuman primates, sensitivity to social power emerged earliest for both vignettes reflecting the resource control dimension, and one of the vignettes reflecting the

goal achievement dimension. Surprisingly, sensitivity to power in one of the vignettes for the setting norms dimension (hypothesized to develop later) also emerged around 7 to 9 years.

Results from control trials suggest that the task was comprehensible for even the youngest children, and that 4- to 6-year-old children understand the literal meaning of 'power' as physical strength. This finding is also consistent with previous findings that demonstrate children's and adults' sensitivity to physical features such as size in determining who is powerful (e.g., Thomsen et al., 2011; Brey & Shutts, 2015, Schubert et al., 2008). Furthermore, older children and adults performed at chance for the irrelevant control item. Surprisingly, however, the youngest children performed above chance on the irrelevant control, consistently selecting the character on the left (the one drawing a triangle) more often than the character on the right (the one drawing a circle). Perhaps children considered triangles to be harder to draw than circles, potentially indicating differences in skill and therefore power. It is also possible that, when faced with a difficult question with no clear answer, the youngest children tended to select the first character as the powerful one. Although the youngest children were above chance for the irrelevant dimension, their performance on that item was still considerably lower than for the physical control ($p = .02$).

Despite indications that the task was comprehensible to even the youngest children, there are two aspects of Study 1 that may have limited the sensitivity of the task for these participants. First, the key question, "Who has more power?", may have been difficult for younger children, and may have conveyed unintended implications. For example, on several occasions, parents commented that their children might not know what 'power' meant, and two child participants asked the experimenter for a definition. Additionally, asking about who had "more" power may have led children to focus on the amount of items a character had, rather than power per se.

Specifically, in several vignettes, one of the agents ended up with more items than the other, though this did not necessarily correlate with the power of the agent. For example, in the Candy vignette, the powerful agent ended up with three candy bars, whereas the less powerful agent ended up with one candy bar. In contrast, in the Clean-up vignette, the less powerful agent held several objects in his/her hands, while the powerful agent held none. For young child participants who were not certain of what was asked, the wording may have led their responses to yield competing results between the powerful character and the character holding more objects. Indeed in the two vignettes where the powerless character was the one holding more objects, young participants responded at chance, meaning they tended to pick the character who ended up with more as often as they picked the powerful character.

A second limitation resulted from the answer choices that were presented. The majority of 4- to 7-year-old children chose "the same" on 7 of the 10 experimental vignettes (Ball, Bridge, Dessert, Blocks, Clean-up, Red T-shirt, and Badge), perhaps as a default when they were uncertain. In contrast, asking children to select one of the depicted characters without giving them the option of saying "the same" is likely to provide a more sensitive measure.

Study 2 is designed to address these limitations and improve the measure of social power. In addition, Study 2 further examines the multidimensionality of social power. So far, I have argued that social power has been defined and studied in the literature in a multitude of ways. Study 1 included vignettes that were designed to assess a subset of possible dimensions of social power, based on conceptually distinct definitions of power found in the literature, including: resource control, goal achievement, permission, giving orders, and setting norms. Specifically, ten vignettes were included, two per each of these five dimensions. As mentioned previously, I do not claim that these dimensions are exhaustive or non-overlapping, but that they represent a

subset of manifestations of social power. In Study 1, the data were not analyzed in terms of dimensions, but in terms of a composite understanding of social power. Study 2 more closely examines each of the dimensions.

Chapter 4

Studies 2a and 2b: "Who is in charge?"

In Study 1, although adults and older children were sensitive to the social power differentials described in most test vignettes, younger children seemed indifferent to them. However, due to the limitations discussed in Chapter 3, it is premature to conclude that children younger than age 7 do not yet grasp the manifestations of social power presented in Study 1. Study 2 provides a revised measure of social power to improve the sensitivity of the task, as well as the interpretability of the results.

Changes to the task

There were four main changes introduced to the task. First, the wording of the question was revised. Second, the answer choices were limited to forced-choice selection of one character or the other. Third, revisions were made to some of the vignettes to avoid interpretative ambiguity. Fourth, participants were asked open-ended questions following each vignette to explain their thinking. These changes are described in more detail below.

As mentioned previously, the question used to measure children's judgments of power ("Who has more power?") likely introduced difficulties for young children. To avoid these issues, in Study 2, I revised the question to be more accessible to younger participants. A prior study examining preschoolers' perception of nonverbal cues to social power (Brey & Shutts, 2015) used the question "Who is in charge?" with successful outcomes. Children in that study seemed to understand the question easily, as indicated by the variation in their responses across conditions. Thus, I decided to adopt this question for my study.

The second major change is that participants were no longer presented with the option of responding with 'the same.' Thus, for each vignette, participants were asked to select one of the two characters as the one in charge. On the rare occasion where participants said the two characters were equal in power, the experimenter would say, "Okay, but you have to pick one of them; who's in charge: X or Y?" This change was aimed at making the measure more sensitive, and avoiding the possibility of young children selecting the 'the same' option as an easy default answer.

Third, the wording of four items was revised to address minor interpretive issues (for scripts of the revised vignettes, please see Appendix C). In Study 1, one vignette described giving permission (Ball), and one vignette described denying permission (Castle). Given that adults performed differently on the two vignettes, in Study 2, both vignettes depicted denying permission in order to provide a clearer and more consistent measure. Similarly, in Study 1, for the setting-norms dimension, one vignette depicted an explicit norm-setting situation (Red T-shirt), whereas the other depicted an implicit norm-setting situation (Badge). Again, in order to provide a clearer and more consistent measure, in Study 2 both of these vignettes depicted an explicit norm-setting situation.

The other items for which changes were introduced were the two control items. The irrelevant dimension item was modified so that the two characters were more similar to each other with a more arbitrary contrast (i.e., one character drew a yellow house with an orange roof, and the other character drew an orange house with a yellow roof). Finally, the physical control dimension was also modified, as the new wording of the question ("Who is in charge?") did not connect to physical strength. Thus, based on previous findings indicating children's and adults' sensitivity to size as an indicator of power (Schubert et al., 2008; Thomsen et al., 2011) in Study

2 and subsequent studies, the physical power vignette depicted two characters that looked very much alike aside from one being visibly taller than the other one.

As a final change, participants in this study were no longer given a 5-point Likert scale to rate the magnitude of power after each vignette. Given that the choice and Likert scale data provided converging evidence, in Study 2 I decided to replace the Likert scale questions. Instead, at the end of each choice question, participants were asked the open-ended question, "How do you know?" These open-ended questions allowed for a more in-depth glance of participants' justifications for the choices they made, and provided insight into children's and adults' reasoning about the vignettes.

Before proceeding with Study 2, however, a pretest (Study 2a) with only adult participants was carried out to confirm that the vignettes used for each dimension were indeed valid measures of those dimensions. Adult participants were asked to identify dimensions that best described each vignette, thereby allowing me to examine adults' perceptions of how well each vignette corresponded to the five dimensions.

Study 2a

Method

Participants. Participants were 35 adults (M = 35.18 years; 13 females) recruited online through Amazon MTurk. All adults resided in the United States. All testing was done online through the use of a survey designed on Qualtrics. On the first page of the survey, participants received a consent form that they had to agree to in order to continue onto the study. At the end of the study, participants were given the option to have their data deleted. However, no one requested to do so.

Measures and Procedure. The survey consisted of the ten test vignettes used in Study 2 (excluding the two control trials), without the accompanying pictures. For each vignette, participants were instructed to select *any* of the following descriptors that they thought best described a predetermined character in the story: controls resources, achieves own goals, denies permission, sets norms, bosses around. These descriptors corresponded to the dimensions that were being measured. Participants were asked to choose all descriptors that they thought applied to the situation. The predetermined character was always the character that was in power, though power was never explicitly mentioned to the participants until the debriefing that followed completion of the study. Vignettes were presented in randomized order for each participant.

Results and Discussion

Results confirmed that the vignettes assessed the five tested dimensions, as predicted. For each vignette, the majority of participants selected the descriptor consistent with the initially predicted dimension (see means for all vignettes in Table 3). One-sample *t*-test comparisons of each vignette to chance (.5) showed that participants selected the predicted dimension as the best descriptor significantly above chance level on every vignette. For 9 of the 10 vignettes, none of the other dimensions were selected above chance. The one exception was the "Ball" vignette (designed to assess permission), for which participants also selected a second descriptor (resource control) significantly above chance.

Study 2b

Method

Participants. Participants were 55 3- to 4-year-olds ($M = 4.10$, age range = 3.05 – 4.98, 28 females), 53 5- to 6-year-olds ($M = 5.87$, age range = 5.01 – 6.95, 32 females), 44 7- to 9-year-olds ($M = 8.30$, age range = 7.02 – 9.95, 30 females), and 42 adults ($M = 28.59$, age range =

18.14 – 39.61, 17 females). Child participants were recruited through a local children's museum, and adults were recruited online through MTurk. Adult participants were limited to the United States, determined by IP address. Participation was voluntary for both children and adults. As compensation, children received a small toy, and adults received $0.50. Written parental consent and child verbal assent were achieved for all child participants prior to testing. Adult participants provided consent before participating. Data from an additional 8 children were dropped because they did not want to complete the study: four 3- to 4-year-olds (M = 4.25, 3.67 – 4.59 years, 4 females), two 5- to 6-year-olds (M = 5.44, 2 males), and two 7- to 9-year-olds (M = 7.08, 2 males). Data from an additional 15 adult participants were dropped due to their age exceeding the pre-determined age range (18-40 years). Because MTurk does not allow prescreening participants during recruitment, I had to limit participants' ages subsequent to data collection.

Measures and Procedure. Changes to the measure are described in detail in the Introduction to this study. All other measures were kept identical to Study 1. In addition, there were a few procedural changes. The assignment of characters to power roles was counter-balanced across participants: 112 participants received a version of the task where one character (identified by name and pattern of clothing) was powerful (assignment A), whereas 81 participants received a version of the task where the other character was powerful (assignment B). However, in each case the position of the powerful character remained the same. This was done to avoid pairings of character names and appearances with power roles as possible confounds. In order to control for possible order effects, the position of the powerful character was counter-balanced across the two vignettes within each dimension, such that the powerful character was on the left for half of the vignettes, and on the right for half of the vignettes. Aside from these changes, procedures of Study 2 were identical to those of Study 1.

Coding and Analysis. As in Study 1, participants received 1 point for each predicted response (i.e., identifying the character predicted to be more powerful on the test trials and physical control trial), and 0 points for each opposite response (i.e., selecting the character predicted to be less powerful on the test trials and the physical control trial). For the irrelevant dimension trial, because there was no correct response, assignment of points was arbitrarily determined, such that selection of the character on the left received 1 point, while selection the character on the left received 0 points. This allowed for analyzing all items on the same scale.

In addition to scoring participants' performance on individual vignettes, several composite scores were calculated. First, composite scores for each dimension of power were created by summing participants' scores for the two vignettes in each dimension, yielding five separate dimension scores for each participant (resource control, goal achievement, setting norms, permission, giving orders). The maximum possible score for these individual dimension composites was 2 (if a participant selected the correct character on both vignettes within a dimension), with chance level at 1. Second, a total correct score was calculated, which was equal to the sum of all five composite dimension scores. Thus, the maximum possible score for total correct was 10 (if a participant selected the correct character on every vignette), chance level was 5, and the minimum possible score was 0 (if a participant selected the opposite character on every test trial). The two control trials were not included in the calculation of the correct total score, and were examined individually.

For the open-ended questions that followed each of the vignettes, there were two levels of coding. For Level 1 coding, each response was coded as either "relevant dimension" or "other". Responses were coded as 'relevant dimension' and received 1 point if they identified the dimension that the power relation was intended to depict, or identified the main element of the

story that made the character more powerful. All other responses were coded as 'other' and received 0 points. Two experimenters independently coded a randomly selected 20% of the data (39 participants) to achieve coding reliability. Because the content of the relevant dimension codes varied across each of the five dimensions, the coding reliability was calculated separately for each dimension. Results for the coding reliability (agreement, kappa) were as follows: resource control (92%, .83), goal achievement (92%, .84), permission (92%, .85), giving orders (82%, .63), and setting norms (90%, .77). The two experimenters reconciled discrepancies, and one of the experimenters completed the remaining coding. The relevant dimension codes were tallied to create the two-level composites identical to those created for the forced-choice responses: individual dimension scores (resource control, goal achievement, permission, giving orders, setting norms) and a total correct score. Table 4 shows sample responses for the coding of responses in each dimension.

For Level 2 coding of open-ended responses, there were 9 coding categories: resource control, goal achievement, permission, giving orders, setting norms, psychological trait, physical trait, other, and no response. Thus, in addition to the different dimensions of power included in the study, responses were coded in terms of whether they referred to the described characters' psychological (e.g., attribution of wants and needs, valence traits) or physical traits (e.g., reference to body size, age, speed, dexterity). It was possible for open-ended responses to receive multiple codes across these 7 coding categories. Responses that did not fit into any of the categories were coded as 'other,' and lack of responses or instances where participants claimed they did not know why were coded as 'no response.'

Results

Responses to choice questions. First, to understand participants' performance on each of the dimensions of power, a repeated-measures analysis of variance was carried out with dimension (resource control, goal achievement, permission, giving orders, setting norms) as the within-subjects variable, and age group (3-4 year-olds, 5-6 year-olds, 7-9 year-olds, adults) and assignment (assignment A, assignment B) as between-subjects variables. Results are shown in Figure 1. There was a significant main effect of age group, $F(3,185) = 25.99$, $p < .001$, $\eta_p^2 = .30$. Post-hoc pairwise comparisons showed that each age group performed significantly better than all of the preceding age groups (ps < .01). There was also a significant main effect of assignment, $F(1,185) = 4.10$, $p = .04$, $\eta_p^2 = .02$, with those receiving assignment B ($M = 1.62$) showing a small but consistent advantage compared to those receiving assignment A ($M = 1.51$). The age group x order interaction was not significant, $F(3,185) = 0.76$, $p = .52$, $\eta_p^2 = .01$.

Importantly, there was a significant main effect of dimension, $F(4,740) = 4.50$, $p = .001$, $\eta_p^2 = .02$. Post-hoc Bonferroni comparisons showed that participants performed better on permission vignettes ($M = 1.68$) than on goal achievement ($M = 1.50$, $p = .01$) and giving orders ($M = 1.46$, $p = .005$). Performance on the other dimensions did not vary significantly from each other. This effect was subsumed under the significant dimension x age group interaction, $F(12,740) = 1.95$, $p = .03$, $\eta_p^2 = .03$. Post-hoc comparisons showed that 7- to 9-year-old children and adults performed similarly on all dimensions except for the permission dimension, where adults ($M = 1.98$) performed better than 7- to 9-year-olds ($M = 1.65$, $p = .016$). Adults performed better than all other age groups (3-4 and 5-6) on all dimensions. Seven- to 9-year-olds performed better than 5- to 6-year-olds on resource control ($p = .04$) and giving orders ($p < .001$), and they performed better than 3- to 4-year-olds on all dimensions but the permission dimension ($p = .17$). Finally, 5- to 6-year-olds performed better than 3- to 4-year-olds on goal achievement ($p = .04$)

and setting norms (p = .01). Any effects not reported here were non-significant. These results indicate the piecemeal fashion through which children's sensitivity to social power emerges across development. As opposed to being a unitary concept, sensitivity to different aspects of social power seems to come online at different points of development.

Next, to examine participants' overall tendency to infer power differences in the given vignettes, each age group's mean total correct score was compared to chance (chance level = 5). Results showed that the overall scores for all age groups were significantly above chance (ps < .001). In addition to understanding participants' relative sensitivity to social power across the dimensions, I conducted a series of one-sample t-tests comparing each age group's performance on each dimension to chance (chance level = 1). Results indicated that all age groups scored above chance on resource control (ps ≤ .001), goal achievement (ps ≤ .008), and permission (ps < .001). Three- to 4-year-olds scored at chance on giving orders and setting norms, and 5- to 6-year-olds scored at chance on giving orders. Seven- to 9-year-olds and adults scored above chance on all dimensions. Thus, children as young as 3-4 years of age show a clear understanding of power differentials in the resource control, goal achievement, and permission vignettes that we presented. However sensitivity to power in other dimensions may not emerge until later in development (setting norms does not emerge until age 5, and giving orders does not emerge until age 7).

Responses to open-ended questions. A similar analysis plan was followed for the open-ended response scores (see Figure 2 for results). A repeated measures analysis of variance was conducted with dimension as the within-subjects variable, and age group and assignment as the between-subjects variables. Results were parallel to those found for the forced choice responses. There was a significant main effect for age group, $F(3,185) = 39.09$, $p < .001$, $\eta_p^2 = .39$,

indicating that all age groups performed significantly better than the preceding age groups (*p*s < .003), except that adults and 7- to 9-year-olds performed similarly ($p = .06$). There was a main effect for dimension, $F(4,740) = 16.65$, $p < .001$, $\eta_p^2 = .08$. Post-hoc comparisons showed that participants provided the most dimension-relevant responses for the resource control, giving orders, and setting norms dimensions. Both of these main effects were subsumed under the significant age group x dimension interaction, $F(12,740) = 3.86$, $p < .001$, $\eta_p^2 = .06$. Post-hoc comparisons showed that 3- to 4-year-olds provided the most dimension-relevant responses for the resource control dimension, which was significantly higher than all other dimensions (*p*s < .02), and the least dimension-relevant responses for the permission dimension, which was significantly lower than all other dimensions (*p*s < .04). Five- to 6-year-olds provided the most dimension-relevant responses for the resource control and setting norms dimensions, both of which were higher than all other dimensions (*p*s < .04). Similar to 3- to 4-year-olds, 5- to 6-year-olds provided the least dimension-relevant responses for the permission dimension, which was significantly below all other dimensions (*p*s < .01). Seven- to 9-year-olds performed highest on the resource control, giving orders, and setting norms dimensions (*p*s < .02), and equally low on the goal achievement and permission dimensions. Adults provided the most dimension-relevant responses for permission, giving orders, and setting norms dimensions (*p*s < .01), and the lowest dimension-relevant responses for the goal achievement dimension (*p*s < .005). Finally, there was a main effect for assignment, $F(1,185) = 4.15$, $p = .04$, $\eta_p^2 = .02$, indicating a slight advantage for those in assignment B ($M = 1.35$) compared to those in assignment A ($M = 1.19$), though assignment did not interact with age group or dimension.

Level 2 coding was done for two of the dimensions: resource control and permission. Both of these dimensions were those that even the youngest age group in this study showed

sensitivity to. However, Level 1 coding showed that 3- to 4-year-olds did not provide many dimension-relevant responses for either dimension, and that for the permission dimension even older children and adults did not perform very well. For the resource control dimension, 45% of 3- to 4-year-olds' responses were coded as 'resource control', 41% were coded as 'no response,' 11% were coded as 'other,' 4% were coded as 'psychological trait,' and 2% were coded as 'permission.' For the permission dimension, 44% of 3- to 4-year-olds' responses were coded as 'no response,'24% were coded as 'resource control,' 13% were coded as 'other,' 13% were coded as 'permission,' and 7% were coded as 'psychological trait.' In contrast, of adults' open-ended responses for the permission dimension, 85% were coded as 'permission,' 12% were coded as 'psychological trait,' 10% were coded as 'resource control,' 7% were coded as 'other,' and 1% were coded as 'giving orders.' Table 5 and Table 6 show the descriptive results for the resource control and permission dimensions, respectively.

Responses to control items. For the irrelevant dimension trial, surprisingly, only the youngest age group performed at chance as predicted, $t(52) = -1.82$, $p = .07$, indicating that they did not show a significant preference between the two characters who drew almost identical pictures. In contrast, all other age groups performed above chance, ps $< .05$, indicating that they selected the character on the left more often than the character on the right. For the physical power trial, whereas 3- and 4-year-olds performed at chance, $t(53) = 0.81$, $p = .42$, older children and adults all performed above chance (ps $< .001$). See Figure 3 for results.

Discussion

In Study 2b, 3- to 9-year-old children and adults were presented with the new vignettes that were confirmed in Study 2a to map onto the five hypothesized dimensions of social power: resource dimension, goal achievement, permission, giving orders, and setting norms. Results

showed that with the modified procedure, where participants were asked to identify the individual that was in charge in each vignette, even 3- and 4-year-olds noticed social power differentials for the resource control, goal achievement, and permission dimensions. This contrasts with findings from Study 1, where 4- to 6-year-old children had performed at chance across all vignettes, confirming that the modifications in the design and procedure allowed for us to more easily tap into young children's concepts of social power.

The findings also showed a clear developmental trajectory, such that an understanding for the setting norms dimension of social power did not emerge until ages 5 to 6, and an understanding of power in the giving orders dimension did not emerge until ages 7 to 9. By age 7, children showed adult-like understanding of power relations, which was also evident in their open-ended responses. These results are consistent with my predictions that, based on comparative studies with nonhuman primates (Tomasello, 2009), understanding of resource control and goal achievement would develop sooner than understanding of other dimensions requiring higher understanding of deontic relations (i.e., permission, giving orders, and setting norms). Surprisingly, however, even the youngest children in this sample were also sensitive to the permission dimension in their selections of the individual in charge. Nevertheless, the low frequency of dimension-relevant responses for the permission dimension across the age groups indicates that although children might be able to consistently identify situations of permission denial as power relations, they may not be able to provide consistent justifications for their responses until later in development.

Together these results show that children become aware of social power differentials between individuals early on. More importantly, young children have an understanding of manifestations of social power that go beyond recognizing individuals' contrasting physical,

nonverbal cues. From a young age, children represent different manifestations of social power, including the ability to control distribution of resources, the achievement of desired goals at the expense of others, and the capacity to deny permission. Over development, children also begin to understand more nuanced forms of social power that require representation of social obligations and norms, and are able to reason about third-party relationships in regards to social power.

Chapter 5

Study 3: Children's concepts of benevolent power

Historically, social psychological perspectives on the purpose of power have been divided in two: *dominance* perspectives and *functionalist* perspectives (Overbeck, 2010). Dominance perspectives broadly refer to power structures expressed through violence and based on oppression, discrimination, and the exploitation of people for a powerful person's or elite group's own benefits (Russell, 1938; Dépret & Fiske, 1993; Sidanius & Pratto, 1999). Examples of such power are frequent in human history (e.g., genocide, racism), as well as children's daily experiences (e.g., bullying). In contrast, functionalist perspectives suggest that because social groups are interdependent and need order for proper functioning, they yield power to one or a few individuals who seem capable of carrying out the interest of the larger group in a focused way (Russell, 1938). Power relations are viewed as necessary and beneficial, and the person in power works for everyone's best interest. This view of power is akin to *legitimate power*, which refers to formal power structures (e.g., the government or legal system) that are given the authority to practice power over people (Weber, 1968; cited in Gordon, 2009). Thus, whereas the former view defines power as corruption and viciousness, the latter view defines it as a mere organizational factor that functions for the better of the people.

Results of Study 2 indicate that children clearly develop a dominance perspective of power early on. The findings suggest that even 3- and 4-year-olds are sensitive to certain dimensions of social power, and that by age 7, children's conceptualization of social power becomes adult-like. However, because Study 2 only included powerful characters that could also

be considered malevolent (e.g., not giving permission, taking more candy), it provides a limited view into children's concepts of social power. Because power systems are such an integral part of our everyday social lives and function in complex ways, it is imperative to understand when children begin to recognize power differentials in benevolent as well as malevolent actors, and whether they are similarly sensitive to more functionalist aspects of power from a young age.

An anecdote shared by the father of a 3-year-old participant illustrates that children's early concepts of power may indeed include a tendency to conflate malevolence with power. The parent recounted that shortly before, his child had come home from school and declared that she knew which of her two teachers was the one in charge. Because the parent knew that the two teachers should be equally in charge, he asked his daughter why she thought so, and the reason was that the teacher she believed to be more in charge was also the one who was meaner. Of course this is anecdotal, and I do not know why the child thought the teacher was meaner, but responses of a similar vein have occasionally appeared during participant comments to the stories presented in our tasks.

Considering these observations and the different ways in which social sciences have defined power, with Study 3 I decided to examine children's understanding of social power in cases where the powerful character could be identified as benevolent. There are two main reasons for this. First, using a protocol similar to that used in Study 2b depicting benevolent yet powerful characters will provide an important control to test that what is measured in Study 2b is indeed children's inferences about social power relations, and not their perceptions of meanness. Second, by providing children situations where the powerful characters are seemingly malevolent or benevolent, we can examine the breadth of their concepts of social power at different ages.

Children's reasoning about malevolence and benevolence

Children differentiate between malevolent and benevolent behavior from a young age, and show marked preferences for prosocial people. In a study by Hamlin, Wynn, and Bloom (2007), preverbal infants were shown an animated circle trying to go up a steep hill but failing midway, and rolling back down. Then, in one condition, the circle was pushed up the hill by a 'helper' character, whereas in the other condition the circle was pushed down the hill by a 'hinderer' character. Results showed that 6- to 9-month-old infants preferred the prosocial character when given a chance to play with the two agents. In fact, these findings were later replicated with infants as young as 3 months of age (Hamlin, Wynn, & Bloom, 2010), indicating that infants distinguish prosocial and antisocial agents from a young age, and show preferences for the prosocial agent. Moreover, in two studies, Hamlin and colleagues (Hamlin & Wynn, 2011; Hamlin, Wynn, & Bloom, 2010) demonstrated that infants' preference for prosocial behavior was only apparent in social relations, and did not emerge when the 'helper' or 'hinderer' manipulated an inanimate object (i.e., a circle with no eyes, and no autonomous motion).

Preschool-age children recognize people's differing traits, and make friendship judgments based on trait information. For example, 4- to 6-year-olds (but not 3-year-olds) show strong friendship preferences for those who are smart, nice, and honest (as opposed to not-smart, mean, and dishonest) (Lane, Wellman, & Gelman, 2013). U.S. English-speaking monolingual 5- and 6-year-olds also show friendship preferences for those who speak with a foreign accent but are nice, as opposed to those who speak with a native accent but are mean (despite showing strong preferences for native accented speakers when all else is equal) (Kinzler & DeJesus, 2013b). Moreover, preschoolers use traits like 'nice' and 'mean' in making inferences about people (for a review, Heyman, 2009). For example, 4-year-olds make inferences about an agent's

motive for a behavior and their emotions for carrying out that behavior based on whether the agent is labeled as nice or mean (Heyman & Gelman, 1999). Four- and 5-year-olds not only assume that targets that display prosociality in one instance will show prosociality in the future, but also infer that the target character has high intellectual and athletic skills (Cain, Heyman, & Walker, 1997). Relatedly, preschool-aged children seek and endorse information from smart, nice, and honest people rather than not-smart, mean, and dishonest people, irrespective of their relative expertise (Landrum, Mills, & Johnston, 2013; Lane, Wellman, & Gelman, 2013; Mascaro & Sperber, 2009). This tendency to use trait information in making inferences about non-relevant domains is also referred to as the 'halo effect' (Fusaro, Corriveau, & Harris, 2011), and emerges when children are asked to make other types of trait inferences as well. For example, 5-year-olds use informants' prior accuracy to make inferences about their future knowledge as well as their prosociality (Brosseau-Liard & Birch, 2010). Similarly, when asked to reason about a puppet that was able to lift a heavy weight, 3- to 5-year-olds expected that the puppet would be nicer, smarter, and stronger compared to the puppet that could not lift the weight (Fusaro, Corriveau, & Harris, 2011). In a study by Corrigan (2003), 3- to 6-year-olds saw pairs of characters, who varied in terms of being good/bad and powerful/weak, and engaged in either positive or negative interactions, and were asked which of the two characters initiated the action, and what the initiator's motive was. Results showed that children assumed that positive interactions were initiated by good characters, and negative interactions were initiated by bad characters; these inferences were heightened by whether the characters were powerful or not. Finally, preschool-aged children also decide on appropriate punishment based on whether the target is described as nice or mean, where they view aggression toward a mean child as more acceptable than aggression toward a nice child when both have engaged in the same harming

behavior (Giles & Heyman, 2005).

The literature reviewed here suggests that children's judgments about people's behaviors may be easily influenced by their perceptions of malevolence or benevolence. However, it is unclear whether this sensitivity would extend to concepts of social power. According to a longitudinal study conducted with preschoolers by Pellegrini et al. (2011), whereas both aggressive and affiliative behaviors predict a child's social dominance in the short term, only affiliative behaviors predicted their maintained social dominance throughout the whole school year. This is consistent with prior findings showing that dominant children tend to be rated positively by their classmates and teachers (Pellegrini et al., 2007). It is also consistent with evolutionary theories regarding social power, where social power is viewed as a combination of conflicts and allegiances with the aim at getting intended results. Therefore, we might expect that even preschoolers would have a concept of social power independent of the niceness or meanness of the powerful character. If young children's performance on the resource control, goal achievement, and permission vignettes of Study 2b is a reflection of their understanding of social power and not an effect of their reaction to meanness, it would be expected that children would understand the same dimensions as reflecting power differentials in benevolent versions. For example, one of the modified vignettes for the benevolent resource control dimension is the Candy vignette, where the powerful character first takes all of the candy bars, but then decides to share them equally between him/herself and the other character. In this case, even though the outcome is that both characters have an equal number of candy bars, the fact that one of the characters had the ability to access more resources than the other and was able to make the decision to share should lead children to view that character as more powerful.

Method

Participants. Participants were 32 3- to 4-year-olds (*M* = 4.33, age range = 3.11 – 4.97 years, 20 females), 26 5- to 6-year-olds (*M* = 6.01, age range = 5.03 – 6.90 years, 17 females), 28 7- to 9-year-olds (*M* = 8.10, age range = 7.15 – 9.88 years, 16 females), and 22 adults (*M* = 26.71, age range = 18.19 – 36.78 years, 11 females). Child participants were recruited through a local children's museum, and adults were recruited online through Amazon MTurk. Participation was voluntary for both children and adults. For appreciation of their participation, children got to select a small toy, and adults received $0.50. For child participants, parental consent and child verbal assent were provided prior to testing. Adult participants provided consent before participating. Data from 3 additional children (ages 3.73, 4.46, 8.19; 2 males) were dropped: one child participant was dropped because the participant was not fluent in English, and two children were dropped because they said they did not know what "in charge" meant. Data from 9 adults were dropped because their ages were not within the predetermined age range of 18-40 years, and because MTurk does not allow recruiting participants of selected age groups.

Measures and procedure. The present study presented a modified version of the protocol from Study 2b to measure children's and adults' perceptions of benevolent power. For this purpose, a subset of the dimensions used in Study 2b were selected: resource control, goal achievement, and permission. Results from Study 2b indicate that all age groups, including the youngest, were sensitive to these three dimensions. Therefore, to measure children's extension of their existing power concepts to benevolent power, as well as to provide a control for the conflation of meanness with social power, it was important to only include the dimensions that all groups were sensitive to. Participants were presented with two vignettes for each dimension. These vignettes were designed to be as similar as possible to those used in Study 2, with the

constraint that they were modified to depict the more-powerful characters as having benevolent intentions. For example, in Study 2 the first permission vignette (Ball) was, "Grup was playing with a ball. Trup asked Grup, 'Can I play too?' Grup told Trup, 'No, you cannot.'" In contrast, the wording of the comparable vignette for this study was, "Grup was playing with a ball. Trup asked Grup, 'Can I play too?' Grup told Trup, 'Yes, you can.'" Appendix D lists the scripts of these new vignettes.

To ensure that the original and modified vignettes for the three dimensions differed from each other in terms of malevolence-benevolence, I conducted a pretest with 23 adults (M = 28.75, 20.89 – 40.97 years) recruited through MTurk. In this pretest, participants were given written text (no pictures) of both the malevolent and benevolent items in randomized order. Names of the characters used in each vignette were replaced with unique letters for each vignette. Participants were asked to rate the protagonist in each story on a 5-point Likert scale ranging from 'Mean' (1) to 'Nice' (5). Paired t-tests of the composite scores for each dimension (i.e., ranging from 2 ('Mean') to 10 ('Nice')) showed that the modified benevolent versions of all three dimensions (resource control, M = 9.13; goal achievement, M = 9.26; permission, M = 9.43) differed significantly from their original malevolent versions (resource control, M = 4.39; goal achievement, M = 6.04; permission, M = 2.74; ps < .001).

The procedure was identical to that of Study 2, with the exception of the open-ended question following each vignette. The question used in Study 2b ("How do you know?") might have been too challenging for young children, as it likely requires more metacognitive processing than asking "Why?" So, in Study 3, the question was changed to "Okay, so X is in charge, not Y. Why is X in charge?" thereby enabling the experimenter to both confirm the child's response to the initial choice question and ask a simpler open-ended reasoning question.

Given that the aim of the current study was to compare participants' sensitivity to power when presented in a malevolent vs. benevolent manner, participants did not receive the control trials.

Coding. The scoring of the choice questions and the coding of the open-ended questions were identical to Study 2b.

Results and Discussion

Responses to choice questions. In order to examine participants' sensitivity to benevolent power in the three dimensions of social power, a repeated-measures analysis of variance was carried out with dimension (3 levels: resource control, goal achievement, permission) as the within-subjects variable, and age group (4 levels: 3-4 year-olds, 5-6 year-olds, 7-9-year-olds, adults) as the between-subjects variable. There was a significant main effect of age group, $F(3,101) = 7.89$, $p < .001$, $\eta_p^2 = .19$. Post-hoc pairwise comparisons showed that 3- to 4-year-olds ($M = 1.18$) performed significantly worse than 7- to 9-year-olds ($M = 1.54$, $p = .002$) and adults ($M = 1.71$, $p < .001$), and that 5- to 6-year-olds ($M = 1.35$) performed significantly worse than adults ($p = .004$). There was also a significant main effect of dimension, $F(2,202) = 23.31$, $p < .001$, $\eta_p^2 = .19$. Post-hoc comparisons indicated that performance on all three dimensions were significantly different from each other (ps < .001), with the lowest performance on goal achievement ($M = 1.16$) and the highest performance on permission ($M = 1.70$). No other significant effects were found in this analysis.

Participants' dimension scores were also compared to chance (3) with a series of one-sample *t*-tests conducted with each age group's overall score. Results showed that the overall score for each age group was significantly above chance (ps < .04). Each age group's mean scores on each of the dimensions were also compared to chance (1). Whereas 3- to 4-year-olds were above chance only on permission, $t(31) = 3.46$, $p = .002$, 5- to 6-year-olds and 7- to 9-year-

olds performed above chance for resource control and permission (ps < .03). Adults performed above chance on all three dimensions (ps < .03). Figure 4 shows age groups' mean performances on each dimension.

Responses to open-ended questions. Using an analysis plan parallel to the one used for the choice responses, a repeated measures analysis of variance with dimension (3 levels: resource control, goal achievement, permission) as the within-subjects variable, and age group (4 levels: 3-4 year-olds, 5-6 year-olds, 7-9-year-olds, adults) as the between-subjects variable was conducted (see Figure 5). There was a significant main effect of age group, $F(3,101) = 17.15$, $p < .001$, $\eta_p^2 = .34$. Post-hoc comparisons showed that 3- to 4-year-olds ($M = 0.33$) performed significantly lower than all other age groups, with adults ($M = 1.51$) providing the most dimension-relevant responses, and 5- to 6-year-olds ($M = 1.12$) and 7- to 9-year-olds ($M = 1.15$) performing similarly to each other. There were no other significant effects in this analysis.

Comparing children's concepts of malevolent and benevolent power. For a better understanding of how responses to the benevolent power items in Study 3 compared to responses to the corresponding dimensions in Study 2b, a repeated measures analysis of variance was carried out with dimension (resource control, goal achievement, permission) as the within-subjects variable, and age group and study (Study 2b, Study 3) as the between-subjects variables (see Figure 6). Here I report only those significant effects involving Study, as all other factors are redundant with the analyses already reported.

Results showed a significant main effect for study, $F(1,292) = 9.02$, $p = .003$, $\eta_p^2 = .03$. Overall, participants performed significantly better when judging malevolent than benevolent vignettes (Ms = 1.60 and 1.44, respectively). Moreover, there was a significant two-way interaction between dimension x study, $F(2,584) = 8.46$, $p < .001$, $\eta_p^2 = .03$. Post-hoc

comparisons showed that participants in the malevolent power study (Study 2b) scored higher than participants in the benevolent power study (Study 3) on resource control and goal achievement, but not permission.

Overall, these results showed that children as young as 3 and 4 years of age represent social power relations even when the powerful character is benevolent. Thus, Study 3 supports the notion that children's concepts of social power are not limited to situations of malevolent dominance, but that children are also able to represent power independently of their representation of meanness. It is important to note, however, that identifying social power relations in situations where the powerful character was malevolent was easier than when the powerful character was benevolent, both for children and adults.

Whereas even 3-year-olds' total scores were above chance, the three dimensions yielded different developmental trajectories. For 3- and 4-year-olds, although their overall scores did not differ significantly from 5- to 6-year-olds', the only dimension where sensitivity was observed was permission. In fact, permission was the only dimension endorsed by all age groups as determining who is in charge, showing an early and consistent conceptualization that giving permission makes a person as powerful as denying permission. This was also supported by the analyses comparing Study 2b and Study 3, where permission was the only dimension where there were no differences. In addition to permission, children 5 years and above (and adults) also showed sensitivity to resource control in selecting the character in charge. However, only adults used the goal achievement dimension in determining the powerful character. Whereas participants provided fewer dimension-relevant responses to open-ended question compared to their accuracy in the choice questions, the overall developmental patterns are consistent.

It is interesting that children and adults were not as sensitive to the resource control and

goal achievement dimensions when the character was benevolent than when the character was seemingly malevolent. These findings suggest that an understanding of malevolent power develops earlier than benevolent power, as indicated by the incremental progression observed as children in this study get older. There are possible evolutionary explanations for children's easier recognition of malevolent power than benevolent power. An important task for developing children is to differentiate prosocial and antisocial others, in order to build allegiances with the right people and avoid the wrong people. Thus, researchers have suggested that negative behaviors (e.g., meanness) are conceptually privileged, as their early recognition may be crucial for survival (e.g., Cacioppo & Berntson, 1999). Recent studies with preverbal infants support this claim, by showing that infants differentiate not only between antisocial and prosocial characters, but also between antisocial and neutral characters (Hamlin, Wynn, & Bloom, 2010). Studies have also shown that infants show earlier sensitivity to fearful or angry faces (for a review, Vaish, Grossmann, & Woodward, 2008), to the extent that neural sensitivity in 7-month-olds' eyes to such threatening faces can be detected at an unconscious level (Jessen & Grossmann, 2014). Studies with preschoolers and older children have also suggested that negative information is privileged. For example, Fivush, Hazzard, Sales, Sarfati, and Brown (2003) found that 5- to 12-year-olds showed better recall for negative events than positive events. Given the importance of recognizing cues to social power in others, it might be that children's cognitive readiness to recognize negative behaviors in others extends to their concepts of social power.

In addition to the adaptive advantage of recognizing malevolent power early on, understanding benevolent power may require higher cognitive skills than understanding malevolent power. Ethological studies of preschoolers and older children have shown that children use a combination of coercive and prosocial behavioral strategies in attaining social

dominance among peers (for a review, Hawley, 1999). To illustrate this simply, Pellegrini et al. (2011) give the example of a dominant child using aggression to defeat a peer in a competition for resources, but then reaching out to the peer to apologize or console. Studies of peer and teacher ratings show that children who are socially dominant tend to be liked and viewed as socially competent (Pellegrini et al., 2007), and that dominant children's use of coercive and prosocial strategies varied throughout the school year (Pellegrini et al., 2011; Roseth et al., 2011). Whereas coercive and aggressive strategies were used more often in the beginning of the school year, these behaviors were replaced with prosocial behaviors in the second half of the school year. The authors argued that these results show dominant children's successful use of differential strategies for establishing and maintaining social power among peers, and found relations between these skills and higher performance on Theory of Mind tasks (Pellegrini et al., 2011). Moreover, Hawley (2003) found that dominant preschoolers who used both coercive and prosocial strategies ("bistrategic controllers") comprised a separate group from children who used only coercive strategies to attain dominance ("coercive controllers"): the former group showed higher understanding of moral transgressions and resultant emotions, and were rated among those liked the most by their peers, whereas the latter group were liked the least. Although these findings describe children's behaviors and not their cognition of social power relations, it is evident through children's popularity ratings in these studies that they differentiate between dominant peers who are nice and malevolent. However, aside from objective measures of social dominance indicating that both bistrategic and coercive children are equally powerful at achieving control, it is unclear as to whether children recognize both types of peers as dominant. Based on the findings indicating that the ability to use prosocial strategies of power is related to higher social cognitive skills (also see Hawley & Geldhoff, 2012), it is possible that the ability to

recognize their bistrategic peers as dominant and represent benevolent social power might also require more sophisticated social cognitive skills. The conceptual link between the use of coercive strategies and social dominance might be relatively straightforward: a powerful child uses direct force at a peer's expense to attain a goal relatively quickly. In contrast, the use of benevolent strategies for social dominance serves the purpose of establishing a more long-term power relationship, where the allegiances established through benevolent strategies are eventually used by the powerful child for his or her own benefit. The conceptual link between benevolence and social power is more indirect and complex, with the person's intention being less explicit. For this reason, children's understanding of malevolent social power may develop earlier than their understanding of benevolent social power.

Part II

Children's concepts of power in social category relationships

Chapter 6

Introduction to Part II

With the three studies in Part I, I found that children from a young age develop an understanding of social power as a relational aspect between individuals. As early as 3 years old, children are sensitive to power relationships between individuals in resource control, goal achievement, and permission situations. Older children also understand power relations in terms of giving orders and setting norms. However, people are classified into culture-relevant categories, and are rarely perceived exclusively as individuals. Evaluations of others often involve consideration of their social group memberships. In fact, studies comparing children's use of individual traits versus social category information have overwhelmingly found that young children privilege categorical information when making judgments about others (e.g., Biernat, 1991; Diesendruck & haLevi, 2006; Rhodes & Chalik, 2014). Dépret and Fiske (1999) found that college students' inferences about the source of someone's power even varied by whether they viewed the person as an individual or a member of a group. When the person was introduced just as an individual, adults based the individual's power on idiosyncratic traits, whereas when the person was presented as a member of a social group, participants' inferences were based on in-group/out-group relations. However, little is known as to whether children understand social group relations in terms of power differentials.

Power relations are central to social group functioning. Studies with children and adults

across cultures show that people have an early-emerging tendency to essentialize social categories (Birnbaum et al., 2011; Diesendruck & haLevi, 2006; Haslam & Whelan, 2008; Mahalingam & Rodriguez, 2003, 2006; Prentice & Miller, 2006, 2007; Rhodes & Gelman, 2009). That is, some social categories are viewed as natural, and members of those social categories are believed to share an inherent, stable essence that defines their membership into the category and determines their external attributes (Gelman, 2003). For this reason, psychological essentialism acts as a cognitive heuristic that allows people to make inductive inferences about social others based on their category membership. For example, imagine that you are trying to buy a gift for a woman with whom you are not very familiar. Because you do not know what she might enjoy or need, it is likely that you will use your existing stereotypical knowledge of what sorts of gifts women like. Underlying this tendency is the assumption that there is an inherent, unifying quality to the category of 'women' that leads members of this category to have shared interests in certain objects. Whereas this sort of thinking might be useful when trying to buy a gift, such essentialist tendencies have commonly been used for justifying system ideologies and ideology-based power differentials (Brescoll, Uhlmann, & Newman, 2013; Jost & Banaji, 1994; Mahalingam, 2003; Sidanius & Pratto, 1999). For example, an essentialist belief ascribing traits like nurturance, submissiveness, compliance to women, and traits like power, assertiveness, and leadership to men will likely imply that these traits are natural and stable, in turn leading to the justification and perpetuation of gender-based hierarchies (Mahalingam & Rodriguez, 2003).

Children essentialize membership in certain social groups from a young age. Social groups guide children's social preferences, and children use social category information for a number of inferences about similarities between people as well as how people relate to one another (Rhodes, 2013a, 2013b). Thinking about social groups also influences children's

cognitive functioning (Cimpian, Mu, & Erickson, 2012). Thus, an important empirical question is whether children's early concepts of social power relations are limited to interpersonal relationships (e.g., the relationship between two classmates), or whether they also extend similar conceptions of power to their representations of intergroup relationships (e.g., the relationship between a *male* classmate and a *female* classmate).

In Part II of my dissertation, I present two studies aiming to address this question by examining children's judgments about social group membership, namely relative age and gender, when they observe power relations between two individuals. In the remainder of this chapter, I first summarize children's early social categorization with particular emphasis on how thinking categorically about social others influences children's reasoning about interpersonal relationships. Then, I explain the relevance of social power to social group relationships, drawing from both developmental and social psychological literature. Finally, I provide an overview of the studies in Part II.

Children's social categorization

From a young age, children construe the people around them in terms of social groups (for reviews, Kinzler, Shutts, & Correll, 2010; Ziv & Banaji, 2012). Studies examining the gaze patterns of preverbal infants show that they differentiate own- and other-group members (for a review, Pascalis et al., 2011). Three- to 4-month-old infants distinguish between men and women, with an early preference for female faces of their own race, but not for females of another race (Quinn, Yahr, Kuhn, Slater, & Pascalis, 2002; Quinn et al., 2008; for a review, Ramsey-Rennels & Langlois, 2006). Six-month-old infants show different scan patterns for own- and other-race faces (Wheeler et al., 2011), and match non-native languages with other-race faces (Uttley et al., 2013). Six- to 9-month-olds also prefer looking at images of same-age infants (Sanefuji, Ohgami,

and Hashiya, 2006). Fifteen-month-old infants imitate a behavior modeled by an adult rather than a same-age peer (although 24-month-olds modeled both the adult and the same-age peer; Seehagen & Herbert, 2011), and 14-month-olds prefer to imitate the novel action displayed by an adult sharing their own native language, rather than an adult speaking a foreign language (Buttelmann, Zmyj, Daum, & Carpenter, 2013).

Preschoolers also form strong expectations regarding within-group similarities, and use social categories (e.g., age group, gender, race) in their inductive inferences and preferences. When learning a novel game, 3- and 4-year-olds imitate adults rather than peers (Rakoczy, Hamann, Warneken, & Tomasello, 2010). Preschoolers prefer individuals who share their native accent, as opposed to those with a foreign accent (Kizler, Dupoux, & Spelke, 2007; Kinzler, Shutts, DeJesus, & Spelke, 2009), trust the testimony provided by native accented speakers over the foreign-accented speakers (Kinzler, Corriveau, & Harris, 2011), and make trait and intelligence judgments based on accent (Kinzler & DeJesus, 2013a, 2013b). Preschool-aged children also make inductive inferences about others' traits and preferences based on gender (Diesendruck et al., 2013; Rhodes & Gelman, 2009; Taylor, Rhodes, & Gelman, 2009), and ethnicity (Birnbaum, Deeb, Segall, Ben-Eliyahu, & Diesendruck, 2010; Diesendruck & haLevi, 2006). When shown ambiguous behaviors modeled by boys, 6- to 9-year-olds are more likely to judge them negatively, than when modeled by girls (Heyman, 2001). Together, these findings show that children begin to categorize people from a young age, and readily use these categories and their beliefs about within-group similarities and between-group differences to make a broad range of inferences regarding others.

Rhodes (2012, 2013a) has suggested that in addition to providing information about how members of the same category are alike, social categories provide important information about

how people relate to each other (also see Diesendruck et al., 2013; Kalish & Lawson, 2008). Rhodes claims that early social categorization develops based on two naïve theories: the naïve theory that social categories mark inherent similarities, and the naïve theory that social categories mark intrinsic social obligations. Specifically, Rhodes (2013) suggests that social category membership informs children of who will help or harm each other. In support of this theory, Renno and Shutts (2015) showed that 3- to 5-year-olds direct prosocial behavior toward members of their own gender and racial groups. Rhodes and Chalik (2013) showed that, when reasoning about novel social groups, 3- to 9-year-olds judge between-group harm as wrong only in the presence of explicit rules against it, whereas within-group harm is viewed is judged as wrong irrespective of formal rules. Rhodes (2014) also found that 4- and 5-year-olds explain interpersonal harm through social category membership, as opposed to the perpetrator's mental state, when the harmful behavior occurs between members of different novel social groups (Rhodes, 2014). Thus, there is a growing body of evidence suggesting that children use social category membership to predict how people will behave toward each other.

Social categories and power

Although there is little direct research on children's understanding of social power in group relations, studies of children's social preferences imply an early sensitivity to power differences between groups. Whereas children assigned to novel social groups of higher status show in-group preferences, children assigned to low-status social groups show out-group preferences (Horwitz, Shutts, & Olson, 2014). Children also show expectations that different social groups differ in relative social status. For example, South African 3- to 10-year-olds believe that White people are wealthier than Biracial people, and Biracial people are wealthier than Black people (Olson, Shutts, Kinzler, & Weisman, 2012). Similarly, South African 6- to 11-

year-old Black and Biracial children showed implicit and explicit out-group preferences for the higher status group (White or Biracial, depending on the contrast presented in the Implicit Association Task; Newheiser, Dunham, Merrill, Hoosain, & Olson, 2014; also see Dunham, Chen, & Banaji, 2013). In a recent study, Dunham, Srinivasan, Dotsch, and Barner (2014) replicated these results with Indian children of upper and lower caste (but not with the lower-status Muslim and upper-status Hindu children, suggesting a divergence for religiosity). Eleven-year-olds judge a novel occupation modeled by a man or White person as being higher status than an occupation modeled by a woman or Black person (Bigler, Averhart, & Liben, 2003; Liben, Bigler, & Krogh, 2001).

According to Sidanius and Pratto (1999), there are three major types of group-based systems of hierarchy: an age system (adults have more power over children), a gender system (males have more power over females), and an arbitrary-set system (power hierarchies based on cultural constructions like race, caste, social status, nationality, sports teams). Whereas the arbitrary-set system is culturally defined and variable, the age and gender systems are observed universally (although, the meanings attributed to the relative statuses within the systems may also show cross-cultural variance). However, despite being similarly universal, the age and gender systems also have important differences in the way they function: whereas the age system is dynamic, in that over time, everyone will experience the more powerful positions, the gender system is highly fixed (even gender reassignment tends not to help with status changes). Given children's early awareness and use of age and gender categories, and the centrality of age and gender systems theories of social power across literatures (Sidanius & Pratto, 1999; Tomasello, 2009), these two domains present ideal starting points for an investigation of how children's understanding of social power relations extends to social categories.

The present studies

The studies in Part 2 of the dissertation examine children's judgments about social power as a function of relative age and gender. In two studies, 3- to 9-year-old children and adults are presented similar vignettes covering the five manifestations of power used in Study 2b, and are asked to decide who is older (Study 4), or who is the boy and who is the girl (Study 5). One possible outcome is that children's early concepts of social power as an interpersonal aspect of relationships would be limited to relations among individuals. If so, children would represent social power dynamics as arising from the specific relationship between two individuals, likely viewing it as constrained by personal characteristics. In this possible scenario, individuals' social category memberships (e.g., race, gender, social class, caste) would have no bearing on the relative social power the individuals display. Alternatively, children might extend their representation of power relations to social categories. If this is the case, children observing power relations might not only make inferences about individual traits of the involved individuals, but they might also make inferences about their social group membership. To illustrate this possibility with an example, if a child observes a dispute over a toy between Tom and Mary where Tom prevails, the child might infer that Tom has more power than Mary because Tom is stronger than Mary (individual power relation), or because Tom is a boy and boys have more power than girls (group-based power relation).

To test these possible predictions, in the forthcoming studies participants were asked about the social category membership of characters after viewing a social power relationship. Thus, participants were primed to think of the individuals as members of a social category. I expected that if children view social power as a characteristic of individual relationships, they would not make consistent inferences about age (Study 4) or gender (Study 5) when given no

other information but social power differentials. Alternatively, if children do represent social power relations in interactions between members of social groups, they should readily make inferences about who is older, or who is the girl and who is the boy based on the information provided on relative power.

Chapter 7

Study 4: Age as a marker of power relations

Age is an important aspect of identity development that everyone experiences (Montepare & Zebrowitz, 1998). It is also used as a social category across cultures (Lewis & Brooks-Gunn, 1979) and is often the basis of social dominance hierarchies (Sidanius & Pratto, 1999). Given its significant role in both self-identification and social development, it is not surprising that children develop sensitivity to age as a social category early on. Adults as well as 15-month-olds differentiate age groups as presented in static pictures of faces (Henns, 1991; Lewis & Brooks-Gunn, 1979). Studies examining infants' perceptual tuning for face recognition find that 9-month-old infants show better differentiation for adult than newborn faces, indicating an early bias to recognize adults (e.g., Cassia, Bulf, Quadrelli, & Proietti, 2014). Two- to four-year-olds correctly distinguish age groups of facial photographs and label the age groups correctly (e.g., baby, child, grown-up; Edwards, 1984). Children and adults identify age group membership by using similar physical cues such as height (Britton & Britton, 1969; Brooks & Lewis, 1976; Montepare, 1995).

In addition to being adept at distinguishing age groups, children also use age as a meaningful way of organizing their experiences, and treat it as a salient social category from an early age. Children choose age matches over gender matches when selecting playmates (French, 1987; Roopnarine & Johnson, 1984). Children's behaviors towards other children vary based on age, with aggressive behaviors directed more at same-age peers but prosocial behaviors directed

more often at younger peers (French, 1987). Fourteen-month-old infants' tendency to imitate the novel action performed by a model on a television screen increases with the age of the model (Zmyj, et al., 2012). Similarly, 3- to 4-year-old children choose to imitate adults rather than other children when learning new words (Jaswal & Neely, 2006), and when learning the rules for a new game (Rakoczy, Hamann, Warneken, & Tomasello, 2010). Four- to 6-year-olds as well as adults view age as having higher inductive potential than gender when making inferences about people (Shutts, Banaji, & Spelke, 2010; Taylor & Gelman, 1993).

Ecological and evolutionary theories suggest that age marks people's affordances and abilities, and that the detection of age serves adaptive functions (Montepare & Zebrowitz, 1998). For example, Lorenz (1943; cited in Montepare & Zebrowitz, 1998) has argued that infantile bodily cues in animals lead adults to modify their behavior to be less agonistic and more protective. Different age groups in humans are associated with different characteristics, and people's treatments of others vary accordingly. For example, studies show that baldness in men (as an indicator of older age) is associated with higher intelligence, higher social status, and lower perceptions of aggression (Muscarella & Cunningham, 1996), and adults with more child-like voices are perceived as more vulnerable (Montepare & Zebrowitz-McArthur, 1987). Thus, power differences linked to age are likely due to universal patterns of caretaking that are biologically required (i.e., parents caring for and raising children). Studies show that young children associate higher dominance and physical strength with taller adults (Montepare, 1995), and know early on that parents and teachers are in charge of children at home and at school (Buchanan-Barrow, 2005). However, social power differences can also emerge within an age group (e.g., childhood, adulthood) based on relative age differences.

In many cultures, children are placed into classrooms or groups of same-aged peers as

early as preschool. Particularly in elementary school and camp settings, age differences become emphasized with the emergence of clear grade differences in children's expected skill development. Thus, young children may become sensitive to age differences even within the same age group. Studies comparing children's mixed-age and same-age playgroups have found differences in the social interactions that emerge. Gray (2011) found that whereas for younger children mixed-age play fostered problem-solving skills under guidance from older children, for older children it enabled the development of nurturance skills in a less competitive environment (compared to same-age play contexts). Similarly, Liu and LaFreniere (2014) presented preschool- and elementary-school-aged children a limited-resource game, and observed higher cooperation (coded as helping, modeling, instructing, active sharing, and yielding play turns) and higher scores on the test game in the mixed-age group than in the same-age group. Although children interact differently with those of different ages (see also Shatz & Gelman, 1973), there is a dearth of developmental research on how social power may be conceptualized as an indicator of relative age differences within an age group.

The current study examined how children's and adults' concepts of social power maps onto age, by asking participants to infer relative age based on the power differentials observed. Participants were presented with the vignettes from Study 2b, including all five dimensions. Based on findings showing associations between adult-like physical features (e.g., voice, height) and higher status perceptions (for a review, Montepare & Zebrowitz, 1998) it was predicted that overall children as well as adults would associate more power with older age. However, different dimensions may lead to different implications for the association of power and age. For example, participants may expect that in resource control and goal achievement conditions, the powerful character will favor the powerless character, similar to a parent-child relationship. If this is the

case, participants' perceptions of social power (i.e., controlling resources, achieving goals) may compete with their beliefs about relationships between older and younger people (i.e., that older people look out for younger people) on these two dimensions.

Method

Participants. Participants were 50 3- to 4-year-olds (M = 4.19, age range = 3.33 – 4.96 years, 22 females), 35 5- to 6-year-olds (M = 5.86, age range = 5.01 – 6.98 years, 18 females), 30 7- to 9-year-olds (M = 8.23, age range = 7.00 – 9.83 years, 17 females), and 46 adults (M = 28.63, age range = 20.85 – 40.56 years, 23 females). Child participants were recruited through a local children's museum and a local university preschool, and adults were recruited online through Amazon MTurk. Participation was voluntary for both children and adults. Child participants were compensated with a small toy, and adults received $0.50. Written parental consent and child verbal assent were achieved for all child participants prior to testing. Adult participants were asked to provide consent before beginning the study. Data from 1 additional child (4.71 years) were dropped because the participant did not complete the study. The age range for adult participants was limited to 18-40 years of age, in order to avoid possible cohort effects. Given the inability to prescreen adults when recruiting participants through Amazon MTurk, data from an additional 15 adult participants were dropped.

Measures and procedure. Measures and procedure were identical to those of Study 2b, except for the type of question that participants received. Participants received the same vignettes describing two characters differing in power, and after each vignette they were asked, "Who is older?" Participants did not hear any explicit mention of power or being in charge; inferences were based strictly on what was presented in each vignette. The two control items were also the same as before. Because children's understanding of the power vignettes presented in this study

was established in the previous studies, there were no open-ended questions in this study. As in Study 2b, 74 participants were assigned to assignment A, and 86 participants were assigned to assignment B.

Coding. Scoring of the choice data in this study was done just as it had been done in Study 2b. Because it was predicted that the more powerful character would be judged to be older, when participants selected the character described to have more power as the older one, they received 1 point; if they selected the other character, they received 0 points.

Results

First, I examined whether participants made relative age inferences based on social power for the five separate dimensions. A repeated measures analysis of variance was conducted, with dimension as the within-subjects variable and age group as the between-subjects variable. Results described below can be seen in Figure 7.

Analyses yielded a significant main effect of age group, $F(3,156) = 5.99$, $p = .001$, $\eta_p^2 = .10$. Post-hoc comparisons showed that adults performed significantly above all other age groups, but that children of different age groups did not differ in their scores. There was a significant main effect of dimension, $F(4,624) = 3.45$, $p = .008$, $\eta_p^2 = .02$, which was subsumed by a significant dimension x age group interaction, $F(12,624) = 3.71$, $p < .001$, $\eta_p^2 = .07$. Post-hoc comparisons indicated that participants in all age groups responded comparably to the resource control, goal achievement, and permission vignettes. In contrast, developmental differences emerged in the giving orders and setting norms dimensions. For both dimensions, adults scored significantly higher than all other age groups, and 7- to 9-year-olds scored higher than 3- to 4-year-olds (ps < .01). Moreover, 3- to 4-year-olds scored highest on resource control, goal achievement, and permission, whereas adults scored highest on resource control and goal

achievement. Other age groups did not show any significant differences between the dimensions.

One-sample *t*-tests were used to compare participants' overall scores to chance (chance level = 5). Results showed that participants in all age groups achieved a total score that was above chance (*p*s < .02), meaning that they showed a tendency to judge those in charge to be older. One-sample *t*-tests were also carried out for each dimension (chance level = 1). Three- to 4-year-olds and 5- to 6-year-olds performed significantly above chance for the resource control (*p*s = .006 and .02 respectively) and permission dimensions (*p*s = .001 and .02 respectively). Both age groups performed at chance on goal achievement, giving orders, and setting norms. Seven- to 9-year-olds performed significantly above chance on the permission (*p* = .01) and setting norms (*p* = .01) dimensions, selecting the more powerful character as older. Adults performed significantly above chance for all dimensions except for the goal achievement dimension (*p*s < .02), for which they were marginally above chance (*p* = .058).

Finally, each age group's performance on the control vignettes was compared to chance (see Figure 8). As expected, all age groups performed at chance for the irrelevant dimension item, indicating that they did not infer any age differences for the two characters drawing similar house pictures. Also as predicted, all age groups performed above chance on the physical dimension (*p*s < .001), indicating that they associated larger physical size with older age.

Discussion

Study 4 presented children and adults with a series of vignettes spanning the five dimensions of power identified in Studies 1 and 2. Each vignette described a power differential between two characters, and participants were asked to infer the characters' relative age groups based on this description. Given the prominence of age for both children and adults in organizing social experiences, it was expected that participants would readily link power differentials to age,

inferring that the more powerful characters were older. However, an alternative prediction was that participants' tendency to associate age and power would depend on the dimension in question.

The results provided evidence for both predictions. When collapsing over the dimensions of power, participants in all age groups consistently inferred that the more powerful character was older. However, there were developmental differences in how this effect emerged across the different dimensions of power. Whereas the more powerful character in the resource control and permission vignettes were judged to be older even by the youngest participants, participants did not link goal achievement and giving orders to age until adulthood, and setting norms was only used in age inferences by 7- to 9-year-olds and adults.

Based on results from Study 2b, we know that participants in the younger age groups are sensitive to power differentials regarding resource control, permission, and goal achievement. With Study 4, their sensitivity to social power differentials between two individuals for two of these dimensions (resource control and permission) extends to their inferences about the individuals' relative ages. In contrast, for goal achievement, although children accurately inferred which character was more powerful, they did not judge that character to be older. Indeed, even the adults' scores on the goal achievement dimension were close to chance. One explanation for this might be that, when asked to make relative age inferences for two target children engaged in a contrasting goals situation, they might expect the older child at times to yield power to the younger child. Thus, children might expect that someone who has more power (i.e., who is in charge) might not necessarily exert that power. These results are consistent with Study 3, where children's conceptualization of benevolent power was measured, as well as observational studies in the literature showing older children's nurturing behaviors toward

younger children in mixed-age play groups (Gray, 2011). Together, these findings suggest that the link between social power and social groups (namely, age) may not entail a simple one-to-one mapping. Instead, children's and adults' theories of how, when, and why people use power, may depend on target individuals' relative positions within a social context. Even though older individuals may be expected to have more power in general, children might not necessarily expect that older children will exert their power over those who are younger in every situation.

Results also showed that 3- to 9-year-olds did not make age inferences about giving orders, and that 3- to 6-year-olds did not make age inferences about setting norms. These results can be partially explained by children's lack of sensitivity to certain power dimensions at certain ages. In Study 2b, 3- to 6-year-olds were not sensitive to giving orders, and 3- to 4-year-olds were not sensitive to setting norms as dimensions of power. Thus, their lack of relative age inferences can be attributed to their indifference to the power relations in these dimensions. However, despite showing sensitivity to the setting norms dimension when asked who is in charge, 5- to 6-year-olds in this study did not make consistent age inferences in setting norms situations. Similarly, despite accurately judging who is in charge for the resource control and giving orders dimensions, 7- to 9-year-olds did not make age inferences within these dimensions. Again, one possible explanation is that participants in these age groups did not view these dimensions as predictors of age. Another possible explanation is that they view older children as more powerful, but also as more nurturing and benevolent, which may lead them to expect that older children would exercise more benevolent power than subjugating power. For example, 7- to 9-year-olds might believe that, although those who have more power would tend to hold more resources, older children should or would share equally with their younger peers. Importantly, however, that participants of all ages responded accurately to the irrelevant control dimension,

and selected the taller character to be older in the physical control dimension, show that even the youngest participants had a clear understanding of the task.

The results from this study suggest that children use social power differentials to make inferences about others' relative ages from a young age, indicating that children readily and easily map their concepts of social power relations onto age. These findings raise a number of interesting questions for future research. Although children's ease at inferring relative age from social power information was impressive, because the task asked about relative age within an age group as opposed to age group differences, it might be that children's abilities to link social power to age are underestimated. It is possible that if participants were asked to reason about between-group age differences (e.g., having to judge who is the adult and who is the child, or who is the young adult and who is the older adult), the inferences made would be different. For example, children may have early-emerging expectations that adults have a social role that entails giving orders and setting norms. On the other hand, if participants were asked to determine who is the young adult and who is the elderly adult, they might assume that younger adults would be equally powerful as older adults, or even more powerful in certain situations (e.g., physical power, but also other more relational dimensions of power).

The extent to which social power is mapped onto relative age differences may vary based on cultural context. One important variable to consider in understanding children's early tendencies to represent age differences in terms of social power might be whether the participant children have siblings, and if they do whether they are the older or younger siblings. This variable may be particularly important in certain cultural contexts (particularly non-industrialized or rural communities), where older siblings (6- to 10-year-olds) take the role of caregiver for their younger siblings early on (e.g., Brody & Murry, 2001; Maynard, 2004; Whiting &

Edwards, 1992). Whiting and Edwards (1992) observed that sibling caregiving relationships are ideal environments for older children to learn nurturance skills. They also suggested that both older and younger children learn about social dominance relations in these situations: whereas older children gain dominance skills to ensure the younger sibling's surveillance and safety, younger children learn about socially-accepted ways of behaving by being reprimanded and punished by their older siblings. Therefore, studies of different contexts might find that, for children who experience sibling caregiving relationships early on, the mapping of social power onto age differences may be stronger and may emerge earlier in development.

Chapter 8

Study 5: Gender and power

Gender is a social category that is historically as well as presently characterized by clear connections to power. These include historic patterns of gender discrimination (primarily toward women and transgender people), and may reflect the common belief that men and women are fundamentally different (Heyman & Giles, 2006; Sidanius & Pratto, 1999). Although there is extensive research on children's early acquisition and use of gender as a salient social category (for a review, see Leaper, 2013), little is known about whether and how children associate gender with social power differences. The purpose of Study 5 was to address this issue.

Gender is an early-emerging, salient social category that guides children's inferences (e.g., Diesendruck, Goldfein-Elbas, Rhodes, Gelman, & Neumark, 2013; Gelman, Collman, & Maccoby, 1986; Maccoby, 1988; Martin, 1989; Rhodes & Gelman, 2009; Rhodes, Gelman, & Karuza, 2014; Shutts, Pemberton Roben, & Spelke, 2013; Taylor, Rhodes, & Gelman, 2009; Waxman, 2010). Studies show that even infants distinguish between men and women (for a review, see Ramsey, Langlois, & Marti, 2005). In a series of studies, Quinn, Yahr, and Kuhn (2002) showed that 3- to 4-month-old infants showed a spontaneous preference for female faces than male faces, but that those who were reared by male primary caregivers developed a preference for male faces (also see Quinn et al., 2008). By 8 months, preverbal infants can match voices to gender (Patterson & Werker, 2002). Although arguably infants' early categorization of gender is largely based on perceptual capacities, by 24 months, children can accurately label

themselves and others as boys or girls (Campbell, Shirley, & Caygill, 2002; Leinbach & Fagot, 1986) and display early preferences for gender-typed toys (Carter & Levy, 1988; Martin, Eisenbud, & Rose, 1995) as well as same-gender peers (Edwards & Whiting, 1988; Jacklin & Maccoby, 1978; Maccoby & Jacklin, 1987; Nadelman, 1974). Children learn gender stereotypes and can identify gender-typed activities (Gelman, Taylor, Nguyen, 2004), and by age 4, children are avid enforcers of these stereotypes, resisting counter-stereotypical behaviors from others (Bussey & Bandura, 1992). Young children show same-sex biases when asked to remember gender-typed items or activities, as well as characters of different genders (Signorella, Bigler, & Liben, 1997). Children also show better recall for activities or items consistent with their existing gender stereotypes than those that are counter-stereotypical (Signorella & Liben, 1984). Moreover, children view gender as an essential source of inference regarding people's attributes (Gelman et al., 1986; Gelman & Markman, 1986; Shutts et al., 2010; Shutts et al., 2013; Taylor & Gelman, 1993).

Children might also associate gender with social power. For example, Liben et al. (2001) found that 6- to 12-year-old children judge stereotypically male occupations (e.g., doctor, farmer, professor, mechanic) to be of higher status than stereotypically female occupations (e.g., fashion model, nurse, secretary). Additionally, Liben and colleagues showed that 11- to 12-year-old children (but not 6- to 8-year-olds) use gender information to infer the status of a novel occupation (e.g., chandler, limner, higgler), expecting jobs to be of higher status when they are modeled by males than females. However, it is unclear whether the children in Liben et al. (2001) were making status inferences based on gender information, or whether they were simply incorporating stereotype knowledge or even knowledge about occupations in making their inferences. In the study, participants were presented the familiar and novel occupations in

random order, perhaps resulting in children being primed by their stereotype knowledge of the familiar occupations in responding to the novel occupations. Additionally, the jobs presented as stereotypically male and female possibly do systematically vary in status, such that children's responses may have potentially reflected knowledge of gendered patterns in society rather than cognitive biases. More importantly, however, Liben et al.'s findings examine children's expectations about status as an individual trait and do not explain how children understand social power differences as an important aspect of interpersonal relationships.

The present study examined children's and adults' gender inferences when observing social power differentials across the five dimensions of resource control, goal achievement, permission, giving orders, and setting norms. The study was analogous to Study 4, except that participants were questioned about gender rather than age. Specifically, in the present study, participants were shown two individuals engaged in social power relations (similar vignettes to those presented in earlier studies), and asked to identify the girl or the boy in each story. There were several predictions. First, given that children are well aware of cultural gender stereotypes early on, it was predicted that children might use their existing stereotype knowledge to infer that the children with more power are boys. This prediction is consistent with findings from Charafeddine (unpublished dissertation), who conducted a study where 3- to 6-year-old children from France, Norway, and Lebanon were presented with two characters in a dominance relationship: the submissive character was presented as hunched over with a large belly, and the dominant character was presented as standing tall, slim, and erect, and pointing to the other character's belly. Participants in the study were told that the dominant character said to the submissive character, "You have to do everything I say! Do what I want!" and the submissive character responded, "OK! I will do what you want." Four- to 6-year-olds, but not 3-year-olds,

across all three contexts identified the dominant character as male and the submissive character as female, indicating an expectation among young children consistent with common stereotypes suggesting male dominance. However, Charafeddine examined only one dimension of power in measuring children's inferences: what they refer to as a dominance relation. Moreover, this vignette presented a confound, in that the purportedly dominant character was also arguably more aggressive (and seemingly taller). This is an important point to consider, because many have argued that social dominance and aggression are separate constructs (Pellegrini, 2008; Vaughn & Santos, 2007). The study I present here takes measures to avoid a similar confound, by controlling physical appearance and only manipulating the power dimensions in question.

Alternatively, children might show a same-gender bias, and favor their own gender as the more powerful one. Studies show that not only do children prefer same-gender playmates (Edwards & Whiting, 1988; Jacklin & Maccoby, 1978; Maccoby & Jacklin, 1987; Nadelman, 1974), but they also favor members of their own gender when asked to provide explicit ratings or comparisons (Heyman & Legare, 2004; Martin, 1989; Meltzoff, 2013). Thus, when asked to identify the genders of two characters who have different levels of power, participants may claim that the powerful character is the one that matches their own gender, if being powerful is viewed as a more positive attribute. A third possible prediction is that, given the complexity of interpersonal relations, participants might find it difficult to make gender inferences based on single observations of how two individuals relate to each other. In that case, we might find that participants do not readily make gender judgments based only on social power differentials between two people. Finally, children and adults may hold diverse beliefs about boys' and girls' relative power when it comes to different dimensions of social power.

Method

Participants. Participants were 33 3- to 4-year-olds (M = 4.10, age range = 3.10 – 4.98 years, 16 females), 35 5- to 6-year-olds (M = 5.85, age range = 5.01 – 6.97 years, 18 females), 32 7- to 9-year-olds (M = 8.30, age range = 7.07 – 9.86 years, 16 females), and 28 adults (M = 30.08, age range = 19.41 – 42.95 years, 26 females). Child participants were recruited through a local children's museum, and adults were recruited online through Amazon MTurk. Participation was voluntary for both children and adults. For appreciation of their participation, children got to select a small toy, and adults received $0.50. Written parental consent and child verbal assent were achieved for all child participants prior to testing. Adult participants provided consent before beginning the online questionnaire. Data from an additional 6 children (5 in the 3- to 4-year-old group, 1 in the 7- to 9-year-old group) were dropped because they did not complete more than half of the study, and data from 1 additional child (3- to 4-year-old group) were dropped because the participant was not fluent in English. Data from an additional 15 adults were dropped because their ages exceeded the predetermined 18 - 40 years range. However, in order to maintain the balance of the number of participants in each of the cells, two female adults in the 40 – 42 age range were included in the sample.

Measures and procedure. Measures and procedure were highly similar to previous studies, with important differences. As in previous studies, we used the five selected dimensions of power, and two control dimensions (irrelevant and physical power). For each of the five dimensions, participants heard two vignettes; for each control dimension, they heard one vignette. In each vignette, participants saw two figures of the same shape and size (except for the physical power vignette, where the characters varied in size), which contrasted only in terms of the dimension in question. After each vignette, 75 participants heard the question "Which one is

the girl?" and 74 participants heard "Which one is the boy?" The type of question varied between-subjects, such that a participant heard the same question throughout the task. Gender of participants was balanced across the two groups that received the different questions. These measures were taken to keep the question easy and simple enough for the youngest participants, while controlling for any possible confounds caused by the way the question was asked. For each question type, there were also the two assignments previously used: 78 participants received assignment A, and 71 participants received assignment B.

There were also certain changes introduced to the items to ensure that the vignettes did not contain any additional aspects (aside from the power imbalance in question) that could lead participants to make inferences about the genders of the characters. Specifically, several of the props were changed to be more gender-neutral: the toy truck in the first resource control vignette was replaced with a toy shovel, the basketball featured in the first permission vignette was replaced with a beach ball, the toy castle in the second permission vignette was replaced with a small children's pool, and the flower-like badge in the second setting norms vignette was replaced with a green ribbon. For all of these vignettes, the wording and the sizing of the replaced images were kept as similar to the originals as possible.

Coding. Selection of the boy as the more powerful character in a vignette was assigned a "1", and selection of the girl as the more powerful character in a vignette was assigned as "0". The scores were tallied similarly to Study 2, where there were composite scores for each dimension.

Results

A repeated-measures analysis of variance was conducted with dimension as the within-subjects variable, and participant age group and participant gender as between-subjects variables

(see Figure 9). Results indicated a significant main effect of dimension, $F(4,564) = 5.54$, $p < .001$, $\eta_p^2 = .04$. Post-hoc pairwise comparisons showed that participants scored highest on resource control ($M = 1.20$) and permission ($M = 1.20$), meaning that for these dimensions participants most often judged that the more powerful character was a boy. Participants scored significantly lower on goal achievement ($M = 0.91$), giving orders ($M = 0.99$), and setting norms ($M = 1.03$), and their scores on these dimensions did not differ significantly from each other. The analyses did not yield any other significant effects.

One-sample *t*-tests were conducted to compare participants' overall tendency of judging the powerful character as male or female. First, each age group's mean total correct score was compared to chance (chance level = 5 out of 10). Results showed that whereas 7- to 9-year-olds were significantly above chance ($M = 5.66$, $p = .03$), judging that the more powerful character was a boy, all other age groups were at chance. Because there were no age effects in the previous analyses, we collapsed over age groups to compare participants' scores on each of the dimensions to chance (1). Results showed that participants scored significantly above chance on resource control ($M = 1.21$, $p = .001$) and permission ($M = 1.19$, $p = .001$), but significantly below chance on goal achievement ($M = 0.89$, $p = .046$). Thus, participants overall judged the more powerful characters as boys in the resource control and permission vignettes, but they judged the more powerful characters as girls in the goal achievement vignettes. The scores for giving orders ($M = 0.97$, $p = .62$) and setting norms ($M = 1.03$, $p = .56$) were at chance.

One-sample *t*-tests were also conducted to compare participants' scores in each age group on each dimension to chance (1). Adults linked power to boys in only two of the five dimensions: resource control, $t(52) = 3.43$, $p = .001$, and permission, $t(52) = 2.44$, $p = .02$. Interestingly, adults scored below chance on the goal achievement dimension, $t(52) = -3.30$, $p =$

.002, indicating that they judged the more powerful character to be the girl. Similar to the adults, 7- to 9-year-olds judged the powerful character to be the boy on the same two dimensions: resource control, $t(31) = 2.33$, $p = .03$, and permission, $t(31) = 1.97$, $p = .058$. Whereas 5- to 6-year-olds performed above chance only on setting norms, $t(34) = 2.03$, $p = .05$, 3- to 4-year-olds performed at chance on all dimensions. All tests not mentioned were at chance.

Finally, participants' scores on each control item were compared to chance (.5) (see Figure 10). Overall, participants responded at chance for the irrelevant dimension ($M = .52$, $p = .69$), but above chance for the height dimension ($M = .65$, $p < .001$), indicating that they judged the larger character to be the boy significantly more often than chance. Additionally, each age group's performance on the control items was also compared to chance (.5) using one-sample *t*-tests. For the irrelevant dimension, children of all age groups performed at chance as expected. Adults performed above chance on the irrelevant dimension, selecting the character on the left as the male more often than the one on the right, $t(52) = 2.31$, $p = .03$, perhaps indicating a left-to-right strategy in the absence of any relevant information. For the physical size dimension, it was predicted that participants would judge the larger character to be male. As predicted, 7- to 9-year-olds, $t(32) = 2.25$, $p = .03$, and adults, $t(52) = 4.56$, $p < .001$, performed above chance on the physical size dimension. Five- to 6-year-olds ($M = .57$, $p = .41$), and 3- to 4-year-olds ($M = .50$, $p = 1.00$) performed at chance.

Discussion

In Study 5, 3- to 9-year-old children and adults were presented with vignettes depicting resource control, goal achievement, permission, giving orders, and setting norms. Participants were told that each vignette was about one boy and one girl, and after listening to each vignette, were asked to identify the girl or the boy. Based on findings from Study 2b, we now know that

children as young as 3 or 4 years of age are sensitive to certain forms of power relations between two individuals. When asked to identify the character in charge in Study 2b, even the youngest children in the sample were sensitive to power differentials presented in situations depicting resource control, goal achievement, and denying permission. Furthermore, children began to recognize power relations based on norm setting around age 5, and giving orders around age 7. Thus, given children's early knowledge of gender stereotypes, one possible outcome for Study 5 was for children to make inferences about gender based on the vignettes that they viewed as depicting power. Specifically, if children represent gender in terms of power relations, they may infer that the character depicted as more powerful is the male, whereas the character depicted as less powerful is the female. Alternatively, because power is a desirable trait and dominant children tend to be liked by their peers, children may show same-gender biases in inferring the gender of the powerful character. A third possible pattern is that social relationships between genders might be viewed as more complex than what is portrayed in each of the vignettes. If this is the case, children and adults may not make any consistent inferences for gender based on social power, or their inference patterns may vary across the different dimensions of power.

Results from Study 5 provide some evidence for the prediction that children and adults would link power to gender. However, there were differences across dimensions and developmental differences in how gender inferences were made for the powerful characters. Overall, participants showed a tendency to judge the powerful character as male in the resource control and permission dimensions, but as female in the goal achievement dimension. The giving orders and setting norms dimensions did not yield any systematic inferences. This pattern is also identical to adults' inferences in this study, indicating that adults' use of power to infer gender is situational. Whereas adults have clear expectations about the powerful character being male in

the resource control and permission dimensions, they judge the powerful character in the goal achievement dimension as female.

Differences in boys' and girls' gender development, and the differential treatment of gender by others likely contributed to these findings. Different behavioral traits tend to be valued for girls and boys, which in turn influences differential behaviors. Whereas boys are expected to be assertive and dominant, girls are expected to behave in collaborative ways (Rose & Rudolph, 2006: Selman et al., 1986). For example, studies show differences in children's aggression styles based on gender that emerge between ages 2 and 5 (Archer, 2004; Leaper, 2013), with boys using more direct aggression compared to girls. Thus, adults' expectations regarding girls' and boys' differential styles in assertiveness and aggression may have led them to think that boys would be more powerful in controlling resources and access to permission.

In contrast, goal achievement situations may be viewed as requiring not only assertiveness but also perseverance. Studies in child temperament have found that girls tend to score higher on measures of effortful control (a predictor of the conscientiousness in later personality development; Rothbart, Ahadi, Evans, 2000) compared to boys (Else-Quest, Hyde, Goldsmith, & Van Hulle, 2006). This is evident especially in girls' superior rates in academic achievement and graduation (Leaper, 2013), as well as adolescent girls' and women's higher measures of conscientiousness later in development (Feingold, 1994). For these reasons, adults in this task may have expected girls to be more likely to persevere and achieve their goals than boys.

One possible alternative interpretation of adults' tendency to select females in goal achievement situations is that adults consistently viewed boys as more powerful, but inferred that they sometimes deferred to girls in order to be nice or chivalrous. This interpretation might be

explained by Glick and Fiske's (1996) differentiation between benevolent and hostile sexism, where benevolent sexism refers to the protective aspect of prescribed gender roles. According to this theory, low-status individuals (namely, women) enjoy the "benefits" of subordination through being provided for, protected and cherished by those in high status (namely, men). Studies show that not only men but also women tend to endorse benevolent sexism, more so than hostile sexism, as its benefits outweigh the likely alternative of being of low status and not enjoying any privileges (for a review, Fiske, 2010). In line with this suggestion, adults in this study may have expected that in goal achievement situations boys would defer to girls as a protective or cherishing act. One way of differentiating between these two possible interpretations would be to ask participants to explain their reasoning, providing questions similar to those in Studies 2b and 3. Additionally, an experimental set up where participants are provided with similar contrasting goal situations between a boy and a girl, and either asked to predict the outcome of the situation or to predict who has more power might reveal whether adults consistently identify the girl as both powerful and predicted to achieve her goal first.

In contrast to resource control, goal achievement and permission situations, adults did not make any gender inferences about power relations in giving orders and setting norms vignettes. This indicates that adults expect girls and boys to be equally likely to be the ones giving orders and setting norms. An important point to consider is that both for the setting norms and giving orders vignettes the context of the story was interpretable as a classroom or play setting. Although there are differences in how boys and girls interact with their same-gender peers, studies show that when preschoolers engage in mixed gender play, their games are more egalitarian, and less gender typed (Fabes, Martin, & Hanish, 2003). Thus, for these two dimensions, adults might have reasoned that girls and boys would engage on an equal level.

Similar to adults, 7- to 9-year-olds also judged the powerful character to be male in the resource control and permission dimensions. However, unlike adults, 7- to 9-year-olds did not infer that females would be more powerful in the goal achievement dimension. This difference suggests that children at this age more broadly link power to gender (specifically, an expectation that those who have more power will be males). This is also supported by the chance comparisons of participants' total scores, where 7- to 9-year-olds were the only age group to score above chance (indicating selecting males as more powerful). The literature in gender development provides extensive evidence for children's strict adherence to and inflexibility for gender stereotypes below age 9 (Leaper, 2013). Although starting from preschool, children are able to distinguish moral norms from conventional norms, treating the former much more stable and inflexible than the latter, studies show that children do not treat gender norms as conventional until later in development (e.g. Blakemore, 2003; Kalish, 2005; Levy, Taylor, & Gelman, 1995). Thus, the results in this study provide additional support to the findings that children below the age of 9 do not view gender as an arbitrary construct, and that they do not treat gender norms as conventional. Past this age, however, children begin to view gender norms as less stable and more arbitrary (Blakemore, 2003).

The response patterns of younger children were completely different. Five- to 6-year-olds judged powerful characters presented in the setting norms vignettes as male, but performed at chance for all other dimensions. Results of Study 2b indicate that 5- to 6-year-olds represent setting norms as a dimension of social power relations. Thus, this new finding shows that 5- to 6-year-olds use this information to make inferences about gender, and that they expect the powerful character to be the boy. Three- to 4-year-olds did not make any consistent inferences about gender based on power relations demonstrated in any of the dimensions. One possible

reason for this is that the task was too difficult for the younger children. This possibility is also inherent in the finding that 3- to 4-year-olds and 5- to 6-year-olds did not readily infer that the taller character in the physical control trial was male (in contrast to 7- to 9-year-olds and adults). However, there are two reasons to suggest that this was not the case. First, the 5- to 6-year-olds in this study made consistent inferences about who the male was in the setting norms dimension, indicating that they were able to understand the task. Second, the task was directly comparable to that used in Study 4, where 3- to 4-year-olds consistently made age inferences about resource control and permission dimensions of power relations. Additionally, one explanation for why younger children did not make consistent judgments about height and gender might be that girls tend to develop more quickly, and thus in elementary school are often as tall as or even taller than their male classmates. It is possible that if children were asked to reason about adults, they would identify the taller individual as male more consistently.

Overall, the results of Study 5 suggest that children as young as 5 years of age make consistent inferences about gender category membership based on the power relations they observe between two people. As children get older, their assumptions that males have more power in interpersonal relationships extends across several dimensions of social power. At some point between preadolescence and adulthood, people's concepts of social power relations between different genders become more nuanced, possibly coming close to capturing the complexity of such relationships. One reason for this developmental difference might be that, children's understanding of gender as a conventional or flexible category does not begin to emerge until after age 9 (Leaper, 2013; Levy, Taylor, & Gelman, 1995; Rhodes & Gelman, 2009; but also see, Conry-Murray & Turiel, 2012). Thus, whereas young children may attribute power relations between individuals to a factor inherent to gender, older children and adults may

understand that there are other external factors (e.g., culture, situation, personality, the specific nature of the relationship) that contribute to the directionality of power relations between boys and girls.

Interestingly, there were no significant effects of participant gender found in this study. This is in contrast to Sidanius and Pratto's (1999) theory of social dominance, which argues that gender-based power differences are sustained due to men's (higher status) higher tendency to endorse gender-based power differences than women (lower status). Gender differences are typically also found in children's conception of gender: whereas boys tend to hold more strict views of gender, girls are more likely to endorse counter-stereotypical behaviors (Signorella, Bigler, & Liben, 1997). This is explained through high-status groups' desire to maintain their status (Bigler, Brown, & Markell, 2001). Similar tendencies are also seen in adults' (Ho, Roberts, & Gelman, under review; Ho, Sidanius, Levin, & Banaji, 2011) and children's (Hirschfeld, 1995; but also see Roberts & Gelman, under review) tendencies to defer to rules of hypodescent when categorizing multiracial individuals. However, the data from this study do not lend support to these expectations. Although studies have shown early social preferences in preschool-aged children for high-status groups than low-status groups (for a review, Baron & Banaji, 2009), children's explicit system justification tendencies have not yet been demonstrated. For example, Killen and Stangor (2001) showed that whereas 13-year-olds endorsed exclusion when it was to avoid threat to group cohesion, 7- to 10-year-olds did not accept group-based exclusion as morally justified under any circumstance. Thus, children's desire to maintain differences in relative power of boys and girls may not emerge until later in development.

One important issue to consider is that the sample included in this study was part of a highly educated, homogeneous community. Although gender is a cross-culturally significant

social category, the precise power relations involved vary between cultures. Thus, it is possible that if this study were replicated in a more conservative community, the effects might be stronger and children's ability to draw inferences between gender and power might emerge earlier. This prediction is consistent with Rhodes and Gelman's (2009) findings showing that culture plays a role in the development of an essentialist view of social categories. In a study examining children's and adults' beliefs about gender across two contexts, Rhodes and Gelman (2009) found that whereas young children from both a rural/conservative community and an urban/liberal community essentialize gender, essentialist thinking of adults in the urban community were significantly lower than that of adults in the rural community. Moreover, whereas urban children's beliefs about the conventionality of gender increased with development, those in the rural community maintained their relatively strict beliefs about gender. This suggests that although the tendencies to categorize and essentialize are early emerging, the development of these tendencies are influenced by the centrality of the relevant social categorization for the particular cultural context (see also Diesendruck et al., 2013). In any case, the present study provides an important view of how children's early understandings of social power relations may shape their inferences about how members of different social categories (in this case, gender) interact.

Studies 4 and 5 also provide evidence for Rhodes' (2013) theory that social categories mark the ways in which people relate to one another. These findings add to Rhodes' argument by suggesting that, in addition to signaling allegiances (Rhodes, 2013), social categories may also be understood in terms of power differentials. The implications for children's conceptualization of social categories, as well as future directions are discussed further in the next section of this dissertation.

Chapter 9

General Discussion

In the five studies presented in this dissertation, I examined children's and adults' conceptualization of social power as a facet of inter-individual and inter-group relationships. Moreover, considering the complexity and multidimensionality of social power, I studied the development of sensitivity to five possible manifestations of social power: resource control, goal achievement, permission, giving orders, and setting norms. Together, the results of these five studies indicate that beginning at 3 years of age, children show sensitivity to interpersonal social power relations across several manifestations of power. In fact, children display adult-like understandings of social power relations in situations where the powerful individual can be perceived as both malevolent and benevolent. By age 5, children's concepts of social power relations extend to their understanding of relationships between members of social categories (specifically, age and gender), indicating that their representations of social power are not limited to individual relationships. Instead, children represent powerful individuals as relatively older, and as male rather than female. Across all five studies, sensitivity to power is observed earliest in resource control, permission and goal achievement situations; yet, developmental and domain differences are observed in the emergence of sensitivity to giving orders and setting norms situations.

The studies presented in this dissertation provide one of the first and most comprehensive empirical studies of how children develop an understanding of social power as a relational construct. Findings from these studies add to our knowledge of children's representations of

hierarchical and deontic relations between individuals, as well as further our understanding of children's beliefs about how social categories constrain social obligations.

Social power in individual relationships

In Part I, 3- to 9-year-old children and adults were asked to infer which of two individuals had more power across the five dimensions of social power selected for examination. Results showed that even 3- to 4-year-olds were sensitive to social power differences manifested through resource control (the individual with more resources has more power than the other), goal achievement (the individual who attains his or her goal has more power than the other), and permission (the individual denying permission has more power than the one asking for permission). Understanding of setting norms (the individual who sets a norm has more power than the one following the norm) emerged at 5 to 6 years of age, whereas understanding of giving orders (the individual giving orders has more power than the individual following orders) emerged at 7 to 9 years. Thus, by age 7 to 9, children showed adult-like understanding of how social power characterizes interpersonal relations in the five dimensions tested. Moreover, children's sensitivity to social power was not limited to their understanding of power as mean or malevolent. As Study 3 demonstrated, children as young as 3-4 years of age extend their concepts of social power relations to permission situations where the powerful individual gives permission to the one who asks for it. Five- to 6-year-olds also accurately attributed social power in resource control vignettes where the powerful character shares a toy with the other individual, or divides resources up evenly even though he or she has access to all resources. Around 7 to 9 years of age, children began to also represent deferring as a sign of power, where the powerful individual in the goal achievement situations was identified as the one explicitly yielding the right of way or decision-making.

These results add to the existing body of research with infants (Mascaro & Csibra, 2012; 2014; Thomsen et al., 2011) and preschoolers (Brey & Shutts, 2015) showing early sensitivity to nonverbal cues to social power. In addition, although the exact dimensions used differ, the results are consistent with Charafeddine et al.'s (in press) findings that 3- to 5-year-old children are able to accurately identify the "boss" across scenarios depicting a physical fight, a verbal argument, a wealth discrepancy, and an age asymmetry.

The studies presented in this dissertation add to previous findings in several important ways. First, the studies here provided a broader developmental scope through the inclusion of 3- to 9-year-old children and adults, and demonstrate the piecemeal fashion in which a multidimensional concept of social power develops. Whereas an understanding of social power as manifested through resource control, goal achievement, and permission was apparent early on, sensitivity to giving orders and setting norms emerged later in development. Resource control and goal achievement were predicted to be early-emerging dimensions of social power, as they may relate more centrally to individuals rather than dyadic interactions, and may therefore require lower level processing. In addition, the early emergence of sensitivity to resource control and goal achievement dimensions is consistent with evolutionary theories of social power. Comparative studies define and observe social power based on resource control and goal achievement in nonhuman primates as well as human social organizations (for reviews, Cummins, 1996; Hawley, 1999). Competition over resources and desired goals shapes children's early dominance relations starting from preschool years (for reviews, Hawley, 2014; Strayer & Trudel, 1984). Because control over resources and achievement of goals can be fundamental to species survival, it is likely that these capacities are part of an adaptive cognitive system that is tuned to recognize social power hierarchies (Cosmides & Tooby, 1992). In contrast,

understanding social power in situations of permission, giving orders, and setting norms requires the ability to represent social and moral obligations, and shared intentionality. For these reasons, and the lack of examples of these behaviors in nonhuman primate groups, it is believed that these capacities are relatively recent adaptations in human evolution (Rakoczy & Schmidt, 2013; Tomasello, 2009). Based on these theoretical assumptions, I predicted that children's understanding of social power relations in resource control and goal achievement might emerge earlier in development compared to permission, giving orders and setting norms; the relatively more institutionalized contexts surrounding permission, giving orders, and setting norms led to the prediction that these dimensions would be conceptualized later in development. These predictions were partially supported, given the early emergence of sensitivity to power in resource control and goal achievement. Importantly, the permission dimension also emerged as an early-developing manifestation of power for young children. Children correctly identified the powerful character both when they denied (Study 2b) and gave (Study 3) permission to another individual. Thus, compared to setting norms and giving orders, permission seems to be privileged in children's reasoning about social power relations.

Neary, Friedman and Burnstein (2009) found that 4- and 5-year-old children inferred that a character that allowed or denied permission for the use of an object was the owner of that object; 3-year-olds did so when permission was denied but not when granted. Children develop a broad understanding of object ownership as distinct from possession or desire (e.g., Friedman & Neary, 2008; Noles & Gelman, 2014). According to Kalish and Anderson (2011), ownership is one way in which people relate to objects, that grants them status and decision making rights. Because of these two properties of ownership (status and decision making rights), and its early centrality in children's experiences, Kalish and Anderson claim that ownership is one of the first

conventional social norms acquired by children. Data from the studies presented here provide support for this suggestion.

Second, through examining children's concepts of malevolent and benevolent social power, the studies presented here demonstrated the breadth of children's concept of social power. Prior work examining children's concepts of social power relations have focused on powerful characters that could be interpreted as malevolent or neutral (neither malevolent nor benevolent) (e.g., Charafeddine et al., in press). One problem with these studies was that it is unclear whether children were responding to the depicted characters' power differentials, or the dominant character's meanness. For example, in one of Charafeddine et al.'s studies, two puppets were shown to engage in a physical fight, where one puppet consistently won. Three- to 5-year-olds accurately identified the winner as the 'boss.' However, young children observing physical harm show strong objections, even in situations where the person doing the harming is an authority figure (e.g., teacher) (Buchanan-Barrow & Barrett, 1998; Hawley, 1999). Thus, it is difficult to conclude whether children's responses revealed their concepts of social power or physical aggression. In the studies presented here, even in depictions of power that could be interpreted as malevolent, every effort was made to avoid drawing children's attention to aggression rather than power. That children understood power differentials even when the powerful characters were benevolent provided an additional control.

Importantly, although children showed sensitivity to both malevolent and benevolent forms of social power, comparing results of the malevolent and benevolent power studies revealed that understanding malevolent power develops earlier than benevolent power. The lack of age group differences for these findings suggest that identifying a powerful character is easier even for adults when the character is depicted as malevolent than benevolent. Thus, both adults

and children may conflate power and malevolence to a degree, where identifying power across some manifestations (i.e., resource control, goal achievement) is perhaps more straightforward when the powerful character is mean and selfish. Understanding benevolent power might require attention to more subtle cues, or the development of a broader concept of social power. Alternatively, young children may lack sufficient information processing capacities to represent benevolent power. Compared to malevolent power, benevolent power implies concealed intentions. From the perceiver's point of view, whereas in malevolent power behaviors the causal relation between intention and action is clear and straightforward, for benevolent power behaviors, the relation between intention and action may not be as clear. In order to represent benevolent power accurately, young children need to understand both the particular cues to social power and the agent's choice to use their power for a benevolent purpose. Moreover, in benevolent power, the agent's power comes from a capacity to act (e.g., the capacity to take all resources) as opposed to the action itself (e.g., taking all of the resources); however, this capacity is not enacted (e.g., the agent shares resources evenly). Thus, descriptions of a powerful individual's benevolent acts may not include as many cues to social power as do seemingly malevolent acts.

Third, the studies presented here were designed to measure children's understanding of social power as a relational attribute between two individuals, as opposed to an individual trait. The vignettes used in these studies described two individuals interacting within the confines of power differentials, and so the results reflect children's reasoning about social power as a relational construct, as opposed to an individual trait. Children use trait information early on to predict others' behaviors or mental states (e.g., Heyman & Gelman, 1998; Heyman & Gelman, 1999). Although certain personality traits are identified as predictors of social dominance, power

relationships occur between multiple individuals (Sidanius & Pratto, 1999). Because all actors bring unique traits to a social interaction, it is important for children to recognize the ways in which people relate to each other and to be able to make inferences based on these relationships.

Social power in intergroup relations

Once it was established in Part I that children showed sensitivity to interpersonal power relations across a number of dimensions, Part II examined the extent to which children use information about social power relations to infer social category membership. Results showed that children's and adults' attributions of social power relations varied across age and gender. When asked to infer relative age, children and adults used resource control and permission, and to a limited extent setting norms and giving orders, in identifying the more powerful individual as older. In contrast, when asked to infer gender, older children and adults used resource control and permission to identify the more powerful individual as male, and adults judged the powerful character in the goal achievement conditions to be female. Thus, the resource control and permission dimensions (and with the exception of age inferences, goal achievement) were consistently used to infer power relations not only between individuals but also between members of social groups.

These findings showed that children and adults do not readily infer the same social power relations across different social groupings. Participants used social power differentials to a greater extent when inferring age than when inferring gender. On the one hand, this is not surprising, considering that age differences involve inherent differences in power. At least to a certain extent (e.g., older adults are not necessarily more powerful than younger adults), a person has more power simply by virtue of being older: with age comes higher muscle composition, higher knowledge, and increased social and cognitive skills, all of which contribute to one's

social power relative to those who are younger. In contrast, gender differences do not inherently lead to differences in social power. This might be particularly true for young children, where gender differences do not map onto strict power differentials. Since participants in these studies were asked to think about two children interacting in each of the vignettes, the tasks may not have tapped into their concepts of gender and power dynamics on a societal level, but rather measured their beliefs and expectations regarding gender dynamics among young children. Given research suggesting that children are sensitive to status differences in stereotypically male and female occupations (Bigler, Averhart, & Liben, 2003; Liben, Bigler, & Krogh, 2001), it is important for further research to replicate these results.

An additional intriguing finding is that participant gender had no effect on the results. Previous research shows that among adults men are more likely to endorse hierarchically structured organizations than women (e.g., Sidanius & Pratto, 1999). It would follow from this finding that there might be gender differences in the extent to which men and women construe power imbalances. However, that participants were asked to reason about children in these tasks may have tapped into their representations of children's relationships with their peers, rather than societal gender relationships, which might explain the lack of gender differences in our findings, as well as the lack of strong connections of gender and power.

Rhodes (2012, 2013a) has recently theorized that social categories, in addition to drawing children's attention to essential similarities between members of the same category, also constrain the types of social relationships that occur between members of the same and other social categories. The results presented in Part II of this dissertation lend support to this theory by implicating a new way in which social category membership constrains relationships. Young children represent social group relations in terms of social power, which is an important

predictor of the types of social interactions that will occur between individuals or members of social groups.

Limitations

There were important weaknesses that are worth identifying. First, although across all five studies, the control items used demonstrated the age-appropriateness of the tasks, as well as young children's understanding of what was asked of them, for some of the individual studies the control items did not work as well as expected. For example, the irrelevant dimension used in Study 2b was not irrelevant for 5- to 9-year-olds and adults, as they selected the character that drew the orange house as in charge compared to the one drawing the yellow house. When open-ended responses were examined, there were no predictable patterns, in that participants seem to have selected the character drawing the orange house (presented on the left, and thus first in order on the page), either because they liked the color orange better, or because they didn't think either of the characters was in charge more than the other. It will be important to conduct a follow-up control condition to attain a measure of a true irrelevant dimension. Similarly, the control items for Study 5 also require modification, as the irrelevant control was not viewed as irrelevant for adults, and 3- to 6-year-olds were not sensitive to the physical control.

A second limitation emerged in Study 3 for the benevolent goal achievement dimension. When the goal achievement vignettes were manipulated to make the powerful character seem benevolent while keeping the vignette as similar to that used in Study 2b as possible, the implications of the dimension may have changed and thus strayed from the initial goal achievement dimension. Specifically, in the benevolent goal achievement vignettes, the powerful character is the one who yields to the other character. Thus, the yielding character demonstrates power by showing initiative and decision-making capacity, but does not end up achieving his/her

intended goal. Therefore, the results from Study 3, specifically children's lack of sensitivity to the goal achievement dimension may reflect this change in meaning, and the increased subtlety in the cues to power.

A third limitation was that in Study 4, where participants were asked to infer relative age based on power dimensions, the height of depicted characters may have presented misleading cues. In each of the vignettes, participants were shown pictures of two characters that were equivalent in height and size, but asked to decide who is older. As the control item for this study also showed, children and adults expect taller people to be older. Thus, when asked to infer relative age between two people of the same height, participants may have made unwanted inferences about characters' power relative to how their age relates to their height. To avoid such additional interpretations, future research should only depict only characters' heads and not their full heights.

Finally, an overall limitation was that information about participant variables was limited. Aside from age and gender information, participants' other demographic variables such as race, ethnicity, family structure, and number of siblings were not collected. These variables could be important in both understanding contextual influences on the development of a concept of social power, and predicting the generalizability of findings from this study. As data for these studies were collected in a children's museum in a college town, many child participants likely came from highly educated and egalitarian families. Thus, it is unclear as to whether the results from these studies would equally describe power concepts for children living in different contexts. Similarly, contributions of factors like family size and structure (e.g., parenting styles) are worth examining to see if they may influence the developmental trajectory of recognizing power relationships.

Future Research

Individual relationships. The findings from these studies also open up several intriguing questions for future research examining children's conceptualization of social power both at the individual and group level. From the way these studies were designed, it is unclear whether children expect social power relations to be stable, and whether they use relational information to make inferences about the interacting parties' individual traits. For example, do children observing a contradicting goals situation where one individual prevails expect that that individual will be powerful across other situations and in interaction with other individuals as well? Mascaro and Csibra (2012) showed that preverbal infants expected dominant individuals to remain dominant across separate, similar situations only if the other, non-dominant agent stayed the same. When the initially dominant agent interacted with a new agent, infants did not show any expectations regarding stability of dominance across situations, leading Mascaro and Csibra to the interpretation that infants represent social power in terms of a relationship between two individuals rather than as a trait inhering within a single individual. Based on these findings, it would be expected that preschoolers and older children would also represent social power relations between two individuals as stable across similar situations.

Additionally, the studies presented here do not examine a unitary concept of social power. Although I have argued, and results show, that for children social power is a multidimensional concept, it is still possible that there is a larger, overarching concept that these different dimensions all tap into. It is unclear as of yet what this concept may be, but one way of examining this question would be to measure children's beliefs about how interrelated different dimensions of social power are. For example, if children and adults view social power as a stable, unitary construct, they may expect that an individual who controls more resources in a certain

interaction will also tend to achieve more goals. It will be important in future research to see whether children have similar expectations, and whether there are limits to their expectations of which dimensions will predict power in other dimensions (e.g., in modern, urban life, being a taller individual does not necessarily translate to being wealthier or having the ability to give out orders).

Just as the concept of social power is multidimensional, interpersonal relations outside the lab are multifaceted, and develop within contextual factors. Even relationships between the same two people may vary depending on the domain. For example, consider the relationship between a surgeon and a pilot. Depending on the domain of the interaction (i.e., whether it is health-related or aviation-related), although the two people involved in the interactions are unchanged, the person in charge will vary. In support of this, Chudek et al. (2012) found that preschoolers imitate prestigious adults only on tasks that are within the domain of the task the adult originally modeled (e.g., artifact-use tasks), but not on tasks that are outside of that domain (e.g., food-preference tasks). Studies have described that when asked who is in charge, children distinguish between the domains where their parents and their teachers are in charge (e.g., Buchanan-Barrow & Barrett, 1998). However, these studies do not provide much insight into how children develop such a differentiated understanding of social power. If children are sensitive to contextual information in judging power relations, they might not find observations of single social interactions sufficient for making stable inferences about gender, age, or other social categories. Thus, an important task for future studies will be to examine the extent to which context influences children's judgments of social power relations across different dimensions of power.

Finally, another area for future inquiry is how social relations influence children's social preferences. Studies of peer relations and childhood popularity have found that dominant children also tend to be imitated and liked by their peers (for a review, Hawley, 1999). On the other hand, children's social preferences are influenced by agents' moral behaviors. Young children express dislike of aggressive and violent peers (for a review, Hay, Payne, & Chadwick, 2004) and show a strong desire for fairness in resource distributions (LoBue et al., 2011; Olson & Spelke, 2008; Shaw & Olson, 2012). Thus, especially given that social power relations can be manifested in seemingly malevolent or benevolent ways, it is important to understand whether social power influences children's preferences for peers, and whether a powerful agent's perceived benevolence or malevolence influences children's perception of their relative power. These sorts of preferences can be measured through the use of measures of prosociality, where children's preferences in sharing as a function of power or type of power displayed can be shown. Moreover, social power concepts might have important implications for children's trust in others' testimony. For example, children may trust adults who display greater power more than those who display less power. One method for examining this question would be a selective imitation task, similar to that used by Chudek et al. (2012), where participants would observe two adults interacting with each other to manifest a power relationship. The two adults would then demonstrate knowledge of a novel piece of information or how to demonstrate a novel task, and children would then be asked which of the adults most likely provided the correct information.

Social category relationships. These studies were part of the first efforts in understanding children's concepts of social power as it relates to social categories. Specifically, the current studies examined children's use of social power information to infer social category membership. A related, unexplored question is whether children can make the reverse inference,

that is, given social category information, can children infer differences in social power? Previous research suggests that children have a harder time inferring categories when given trait information than inferring traits when given category information (Gelman, Collman, & Maccoby, 1986). That children in the studies presented here made category inferences based on single observations of interactions suggests a selective conceptual tie between certain social categories (i.e., age but not gender) and social power. Based on this assumption, it might be expected that if children were given category information (e.g., gender) and asked to predict the outcome of power struggles (e.g., "Who will get more candy bars: the girl, or the boy?"), they might be able to make stable inferences between gender and power more easily. Of course, the design of the present studies does not allow for this particular examination. Thus, in future research, it would be interesting to see whether children are equally or even more likely to make social power inferences once provided with social category membership.

Additionally, an in-depth examination of the specific cues that signal social power relations for some social categories but not others is necessary. Given that they are early emerging and have been shown to give rise to rich inferences, age and gender were selected for these initial investigations of children's attributions of power in social group relations. Age and gender are often cited as universal and primary ways in which social hierarchies are established (Sidanius & Pratto, 1999). However, children show sensitivity to several other social categorizations in making inferences about people (e.g., language, race, ethnicity, social status) from a young age. For example, Kinzler et al. (2009) found that 5-year-olds prefer speakers of their own native language and other-race over foreign-accented same-race speakers. Similarly, 9- to 10-year-old US children living in both Southern and Northern cities judged Northern accented speakers as smart and "in charge," but Southern accented speakers as nice (Kinzler & DeJesus,

2013a). Diesendruck and colleagues showed that Israeli children used ethnicity in making inferences about others more often than they used gender, religiosity, or personality traits (Birnbaum et al., 2011; Diesendruck & haLevi, 2006). Thus, an open question is whether children make social power judgments for other social group relations as well.

The prominence of social categorization in reasoning about people is often interpreted as a means for ideological system justification, and maintenance of group-based hierarchies (Jost et al., 2010). Some system justification tendencies, though not explicit, have been shown among children (for a review, Baron & Banaji, 2009), where 5-year-olds will show adult-like patterns of in-group favoritism when they are of high status group membership, but out-group or lack of in-group favoritism when they are of low-status group membership. These effects seem to emerge particularly for social categories that have historical associations with conflict or tension (e.g., race in the U.S. and South Africa, Dunham, Baron, & Banaji, 2007; Newheiser, Dunham, Merrill, Hoosain, & Olson, 2014; caste in India, Dunham, Srinivasan, Dotsch, & Barner, in press). Given children's sensitivity to status differences of culturally relevant social groups, it is possible that social power relations become emphasized for these groups early on. Thus, future research examining cues to social power relations should explore children's concepts of other cultural groups. This would also involve considering the intersectionality of social categories, and examining children's expectations of relative social power when category memberships are pitted against each other.

Social categories that are essentialized by young children across different cultures tend to mark groups of people that inherit a history of social tension or currently experience categorization-related conflict (ethnicity in Israel, Birnbaum et al., 2011; race in the United States, Rhodes & Gelman, 2009; race in South Africa, Newheiser, Dunham, Merrill, Hoosain, &

Olson, 2014; caste in India, Dunham, Srinivasan, Dotsch, & Barner, in press; Mahalingam & Rodriguez, 2006). Importantly, children who participate in psychological research are not objective observers of social categories. Thus, an important question is how children's own social group membership affects their inferences of social power, particularly when exploring their perceptions of groups that might have steeper power hierarchies. Mahalingam (2003) raises a similar question by arguing that the study of essentialism of social categories cannot be separated from the cultural situatedness of social categories, and the relative social power that members of those categories experience in their society. To demonstrate this point, Mahalingam and colleagues have shown that Indians of Brahmin (uppermost caste in India) and Dalit (lowest caste in India) origin show significant asymmetries in their essentialism of caste (Mahalingam & Rodriguez, 2006) as well as gender (Mahalingam & Rodriguez, 2003). Although developmental studies show that children's own social status predicts the degree to which they show in-group or out-group preferences (Dunham, Chen, & Banaji, 2013; Dunham, Srinivasan, Dotsch, & Barner, in press; Newheiser, Dunham, Merrill, Hoosain, & Olson, 2014), studies examining how children's perceptions of social power relations influences their essentialism of different social categories have not yet been conducted. Now that we know of children's early awareness of social power relations, I look forward to future developmental examinations of this question.

Conclusion

Social power relations are complex, dynamic, and ubiquitous. Despite variations in the exact structures, they are found universally in human as well as nonhuman primate societies, and they constrain relationships both at the individual and group level. Developing an early understanding of social power is adaptive in that it allows one to build allegiances with the right individuals or groups in access to resources and opportunities for reproduction. Recognizing

social power structures early on also allows children to learn necessary skills to successfully navigate their social plane. The studies presented here add to the newly emerging developmental body of literature on how children develop an understanding of social power, by showing that young children are sensitive to several ways in which social power relations are manifested, and that they extend these early concepts to their concepts of social categories (namely, age and gender).

In a recent discussion, Spelke (2015) suggested that studies of children's early-developing concepts of social power might unveil a new area of study for cognitive development. She classified findings from the studies presented here, as well as findings from those carried out by Brey and Shutts, Dunham and colleagues, and Thomsen and colleagues as descriptive of a new conceptual domain that she called *naïve sociology* (see Hirschfeld, 1999). Naïve sociology is set up as distinct from naïve physics and naïve psychology, but also as a domain that develops on top of the latter two, such that an understanding of social power may require the understanding of physical laws of power (e.g., larger is more powerful than smaller), psychological laws of power (e.g., intentions govern power), and social laws of power (e.g., roles within larger social interactions govern power). The studies presented here are one of the first steps contributing to our understanding of children's conceptualization of the social interactional aspects of power. However, further research is necessary to better understand whether conceptualizing power indeed necessitates the study of a new domain of knowledge, or whether it can be understood as part of other cognitive capacities. By better understanding the ways in which children acquire knowledge about power relationships (e.g., innate preparedness, learning, foundational theories), we might be able to answer these big questions.

Table 1

Participants' mean performances on each vignette in Study 1.

	Toy Truck	Candy	Bridge	Dessert	Ball	Castle	Blocks	Clean-up	Red T-shirt	Badge
4- to 6-year-olds	.64	.67	.44	.50	.56	.58	.42	.39	.47	.58
7- to 9-year-olds	.75*	.81*	.64	.69*	.61	.69	.67	.58	.67	.53
Adults	.86*	.94*	.75*	.81*	.86*	.97*	.94*	1.00*	.86*	.72*

Note. In Study 1, participants were asked, "Who has more power?" On each vignette, participants received '1' point if they correctly selected the powerful character, '0' points if they selected the incorrect character, and '.5' points if they responded that both individuals were equally powerful. Each age group's mean scores for the separate vignettes were compared to chance (.5). Values that were significantly above chance are shown (*$p < .05$).

Table 2

Study 1 - Likert scale data

	Toy truck	Candy	Bridge	Dessert	Ball	Castle	Blocks	Clean-up	Red t-shirt	Badge
4- to 6-year-olds	1.56*	1.22	-0.61	0.06	0.39	0.83	-0.78	-1.44	-0.56	0.67
7- to 9-year-olds	1.39*	2.06*	1.28	0.83	0.61	2.11*	0.83	0.67	1.11*	0.22
Adults	2.52*	2.37*	1.07*	1.96*	1.59*	2.78*	2.41*	3.59*	2.22*	1.41*

Note. In Study 1, participants who selected one of the two characters (but not those who selected the 'the same' option) were asked the follow-up question of "How much more power does _____ have?" Responses ranged on a 5-point Likert scale (1: a little bit more, 5: a whole lot more). Then responses to these questions were placed on the same scale ranging from '-5' ('a whole lot more' selected for the incorrect character) to '0' ('the same') to '5' ('a whole lot more' selected for the correct character). Means for each vignette were compared to chance (0). Scores that are significantly above chance are indicated (*$p < .05$).

Table 3

Adults' judgments of vignette-dimension validity (Study 2a)

	Toy Truck	Candy	Bridge	Dessert	Ball	Castle	Blocks	Clean-up	Red t-shirt	Badge
Resource control	**0.77***	**0.86***	0.17	0.26	0.69*	0.57	0.34	0.23	0.11	0.09
Goal achievement	0.66	0.66	**0.83***	**0.80***	0.17	0.20	0.29	0.34	0.31	0.31
Permission	0.40	0.26	0.23	0.20	**0.91***	**0.94***	0.00	0.03	0.06	0.00
Giving orders	0.31	0.17	0.17	0.37	0.46	0.60	**0.91***	**0.86***	0.40	0.57
Setting norms	0.06	0.06	0.17	0.29	0.11	0.09	0.23	0.23	**0.94***	**0.97***

Note. In Study 2a, adult participants were asked to select what they thought was the best descriptors (they were able to select multiple responses) for the target character in each vignette. Mean responses were compared to chance (.5). Vignette-dimension pairings of interest are shown in bold. Scores that were above chance are indicated (*$p < .05$).

Table 4

Coding samples for open-ended questions in Study 2b

	Relevant response	'Other' response
Resource control	She played with the toy truck, and the other girl didn't.	"Because it's not fair."
Goal achievement	"Jeggie crossed the bridge before Feggie did."	"Flip asked nicely."
Permission	"He is not letting him play."	"Because she built it."
Giving orders	"Because Raffy told Zaffy to build the house."	"She might be the oldest."
Setting norms	"Fizz told everyone to wear the shirt and Dizz listened."	"Because he was being bossy."

Table 5

Frequencies for Level 2 coding of 3- to 4-year-old participants' responses to the open-ended questions of "How do you know?" in the resource control dimension (Study 2b)

Coding category	Resource control	
	Toy truck	Candy bars
Resource control (RC)	24	26
Goal achievement (GA)	0	0
Permission (P)	1	1
Giving orders (GO)	0	0
Setting norms (SN)	0	0
No response (N/A)	23	22
Psychological trait (Psy)	3	1
Physical trait (Phy)	0	0
Other	6	6

Table 6

Frequencies for Level 2 coding of participants' responses to the open-ended questions in permission dimension (Study 2b)

Coding category	Permission 1 - Ball				Permission 2 - Castle			
	3-4 years (n = 55)	5-6 years (n = 53)	7-9 years (n = 44)	Adults (n = 42)	3-4 years (n = 55)	5-6 years (n = 53)	7-9 years (n = 44)	Adults (n = 42)
RC	13	18	6	8	9	17	6	0
GA	0	0	0	0	0	0	0	0
P	7	20	29	33	9	19	27	38
GO	0	0	1	0	0	0	0	1
SN	0	0	0	0	0	0	0	0
N/A	25	8	1	0	24	9	2	0
Psy	4	3	0	10	2	1	1	0
Phy	0	0	0	0	0	0	1	0
Other	7	4	6	3	11	7	8	3

Figure 1. (Study 2b) Mean correct scores on each dimension for each age group in choice questions ("Who is in charge?"). Score for each dimension is a composite sum of the scores of the two relevant vignettes. Scores that are significantly above chance are indicated (* $p < .05$).

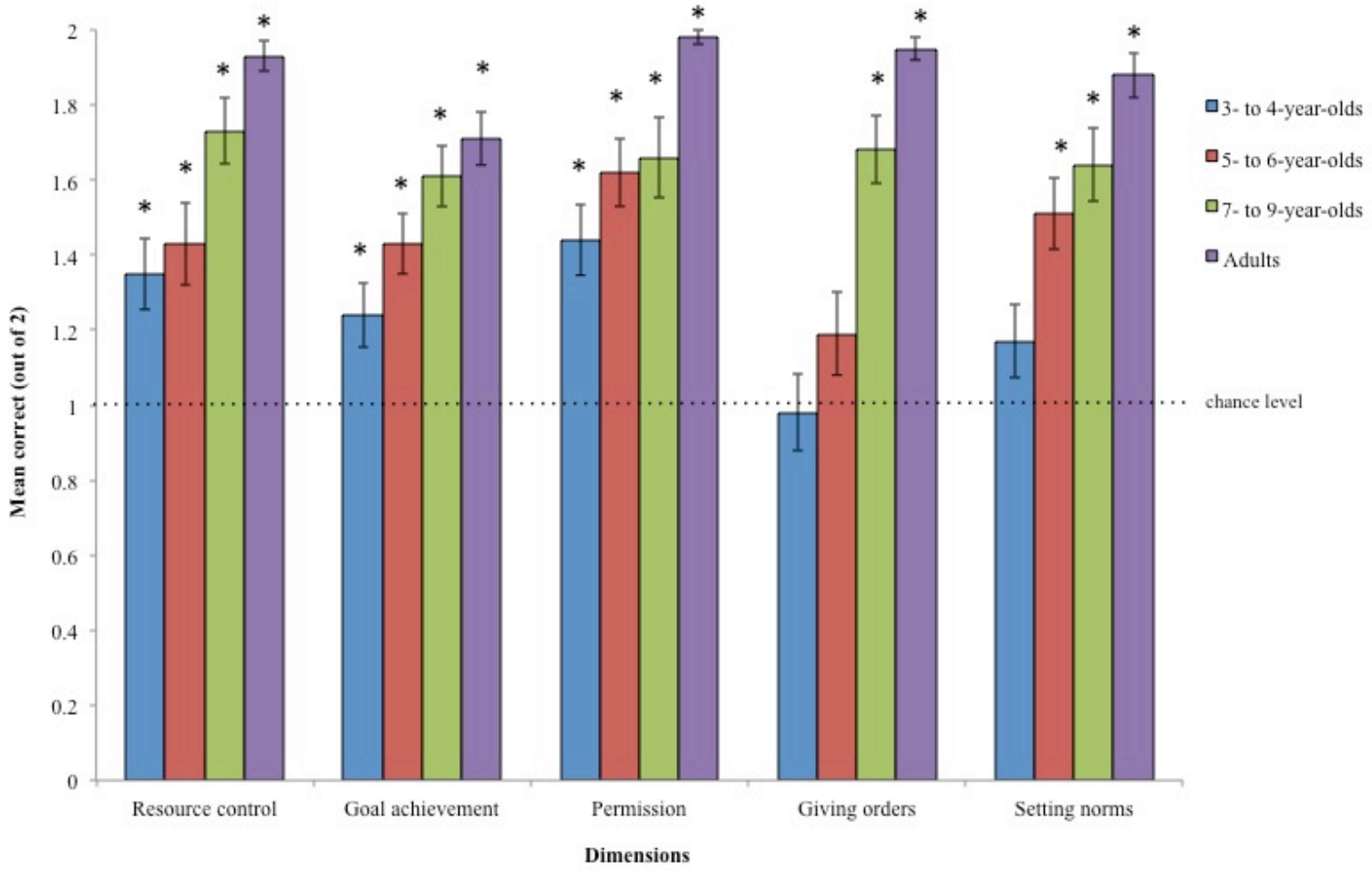


Figure 2. (Study 2b) Mean number of open-ended responses coded as 'relevant' are shown for each dimension, by age group.

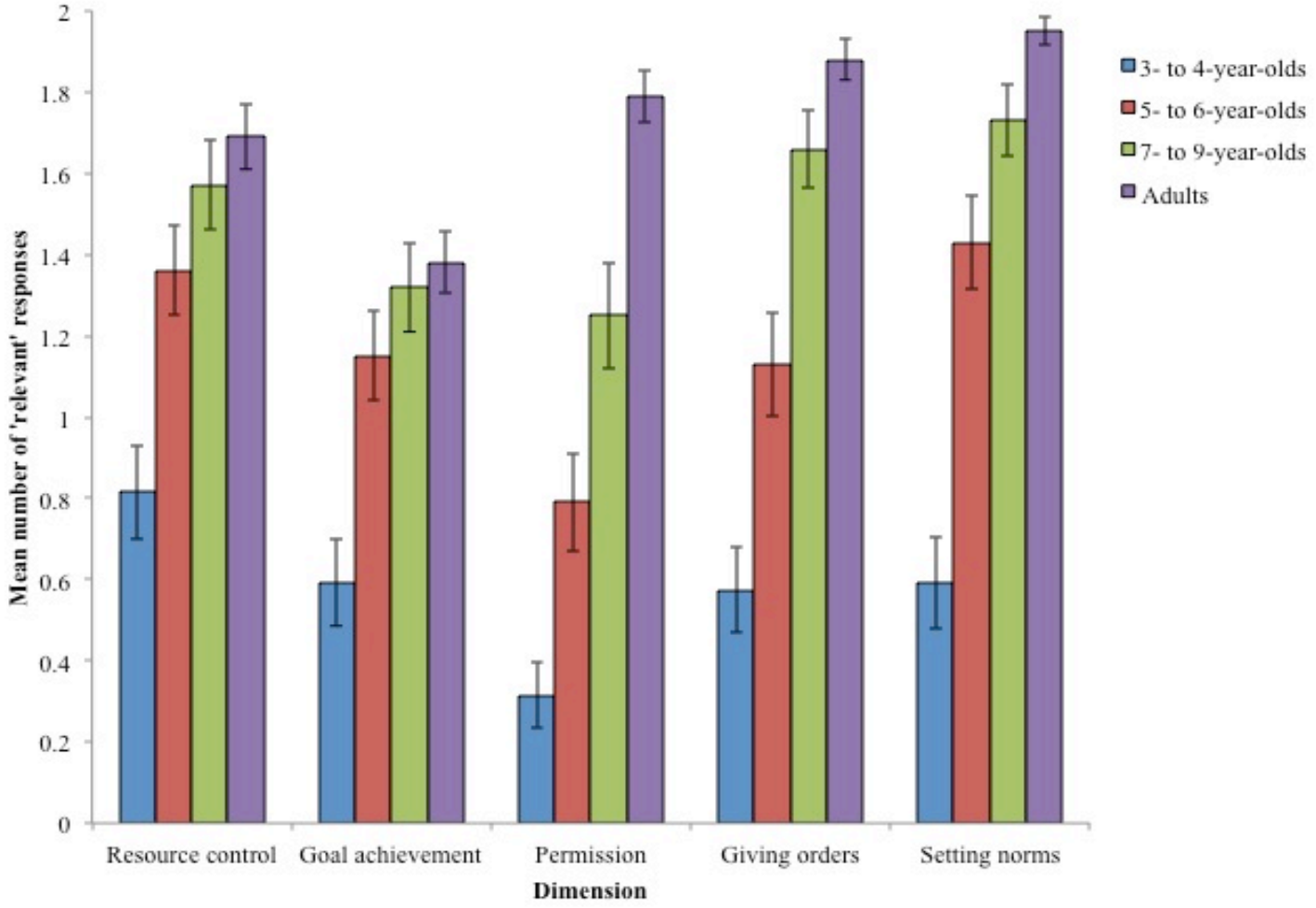


Figure 3. (Study 2b) Mean scores for each control trial, by age group. Scores that are significantly above chance are indicated (* $p < .05$).

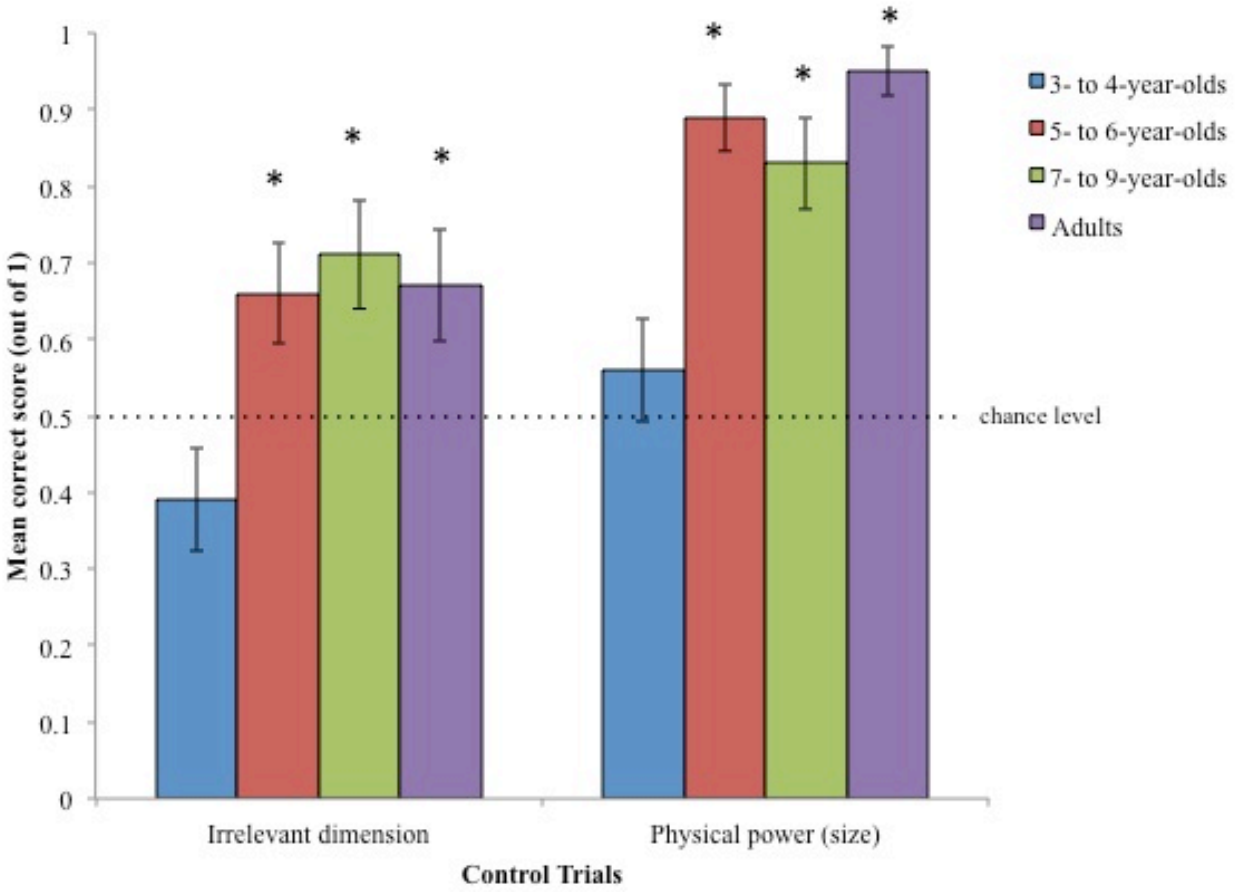


Figure 4. (Study 3) Mean correct scores on each dimension for each age group in choice questions ("Who is in charge?"). Score for each dimension is a composite sum of the scores of the two relevant vignettes. Scores that are significantly above chance are indicated (* $p < .05$).

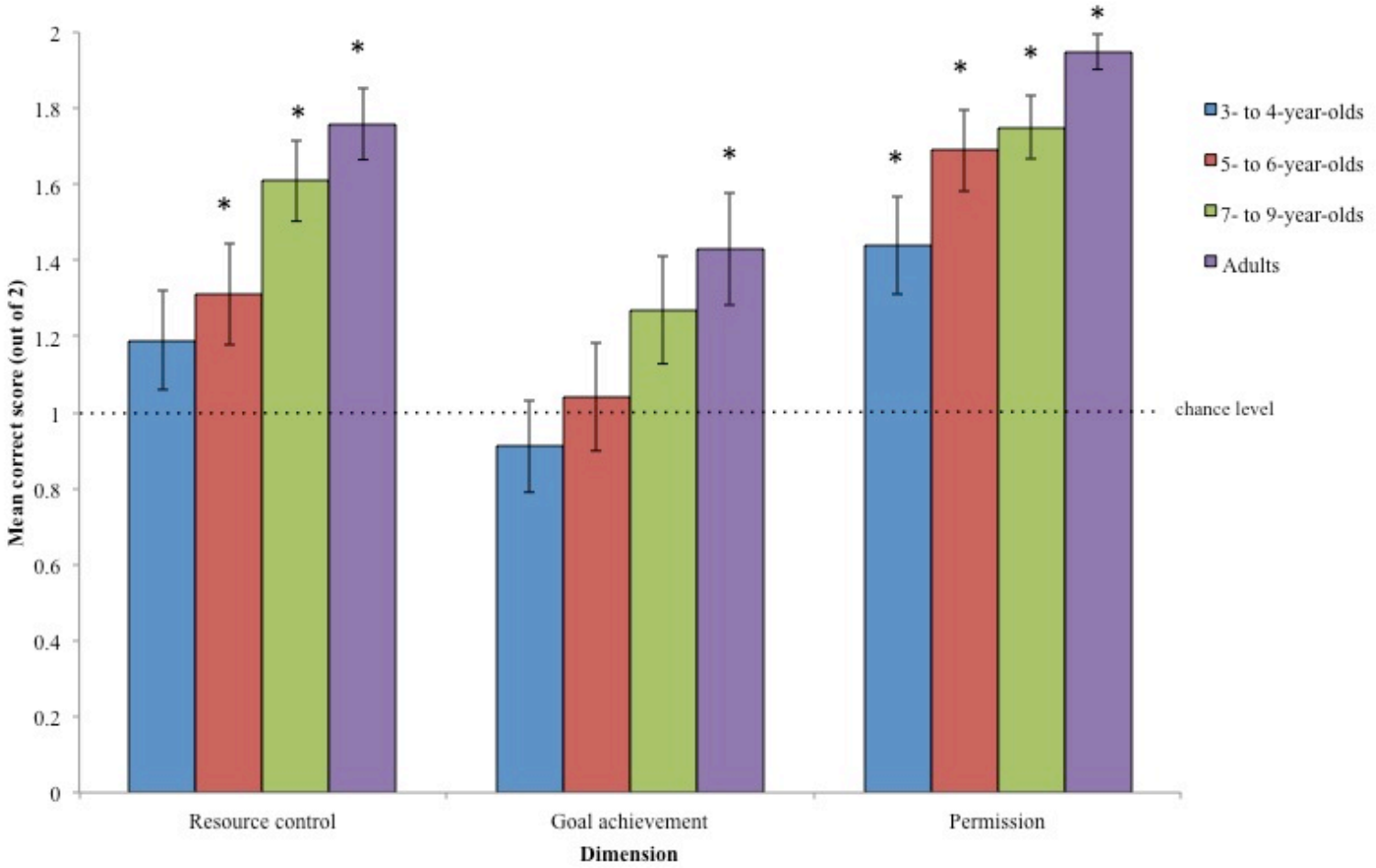


Figure 5. (Study 3) Mean number of open-ended responses coded as 'relevant' are shown for each dimension, by age group.

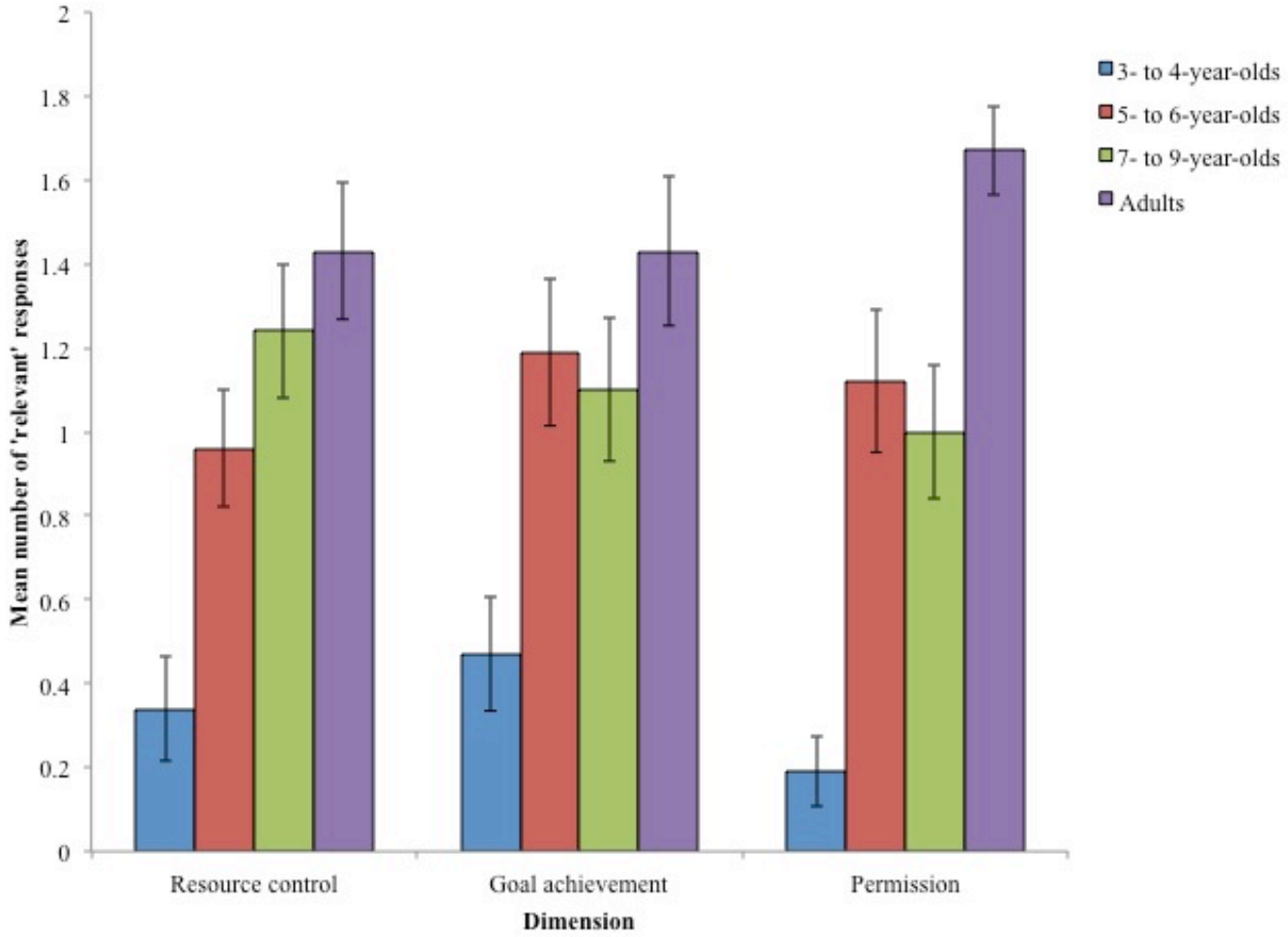


Figure 6. Comparison of mean correct scores on choice questions of Study 2b and Study 3. Significant pairwise differences are indicated (* $p < .05$).

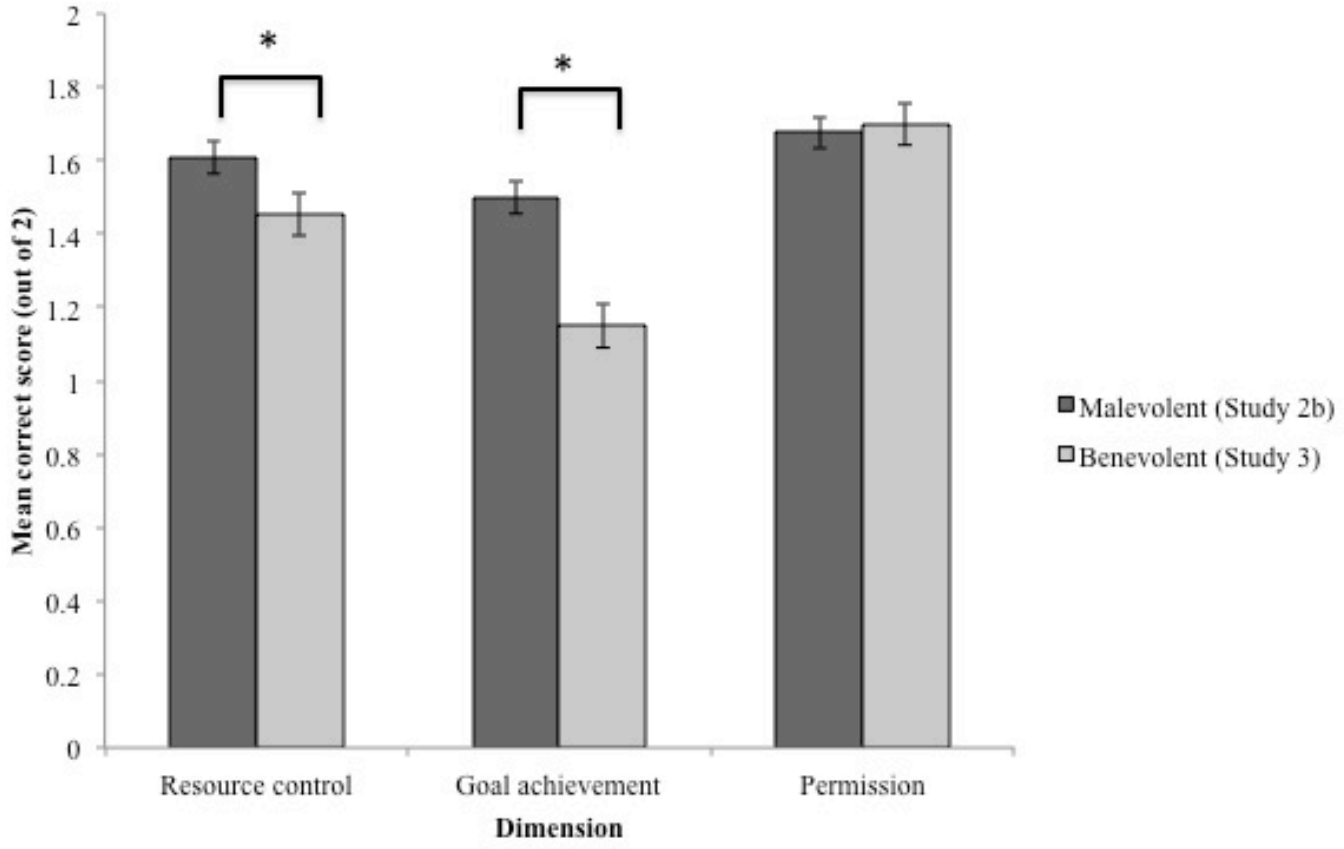


Figure 7. (Study 4) Mean number of times participants judged the powerful character to be older for each dimension, by age group in choice questions ("Who is in older?"). Score for each dimension is a composite sum of the scores of the two relevant vignettes. Scores that are significantly above chance are indicated (* $p < .05$).

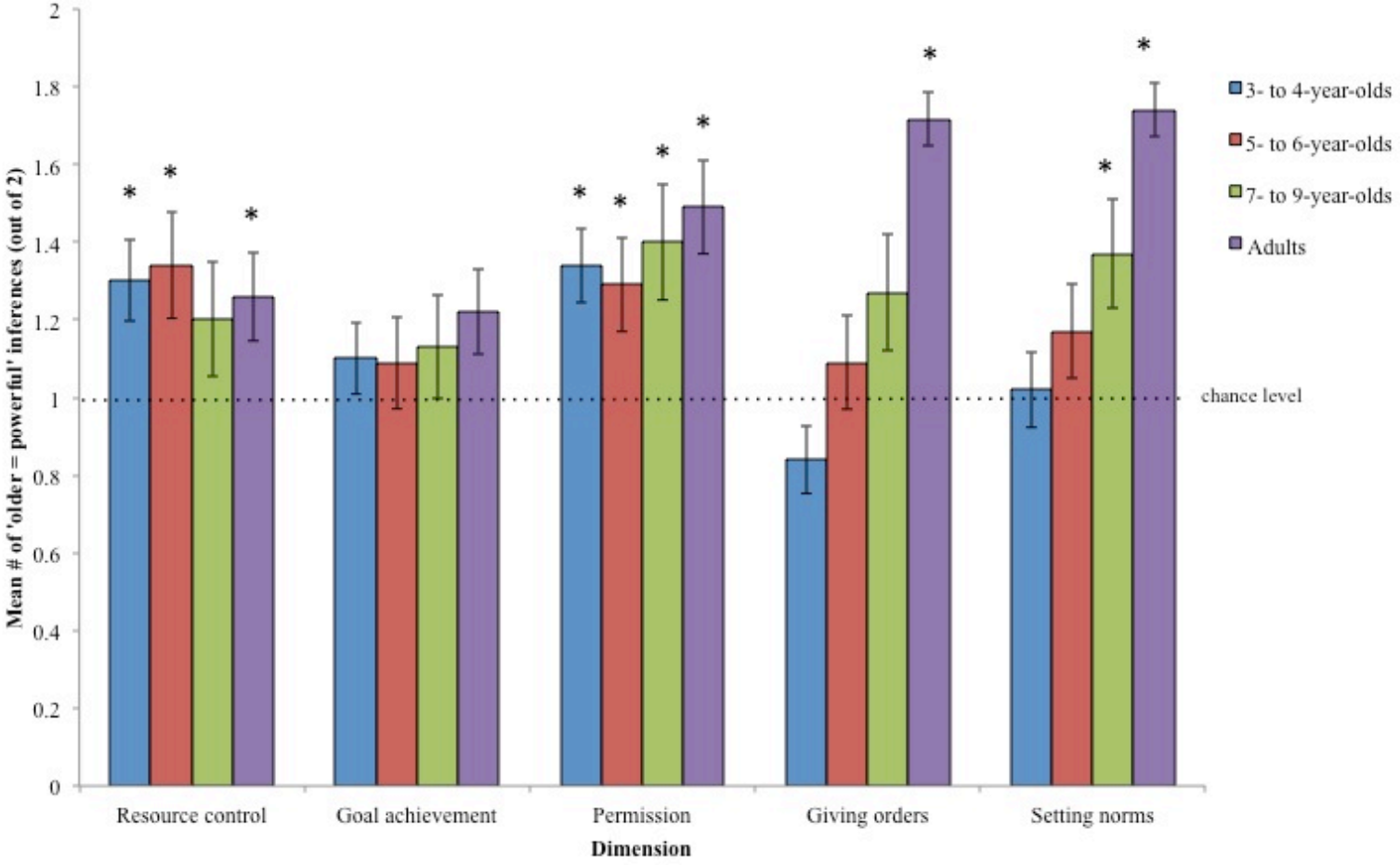


Figure 8. (Study 4) Mean scores for each control trial, by age group. Scores that are significantly above chance are indicated (* $p < .05$).

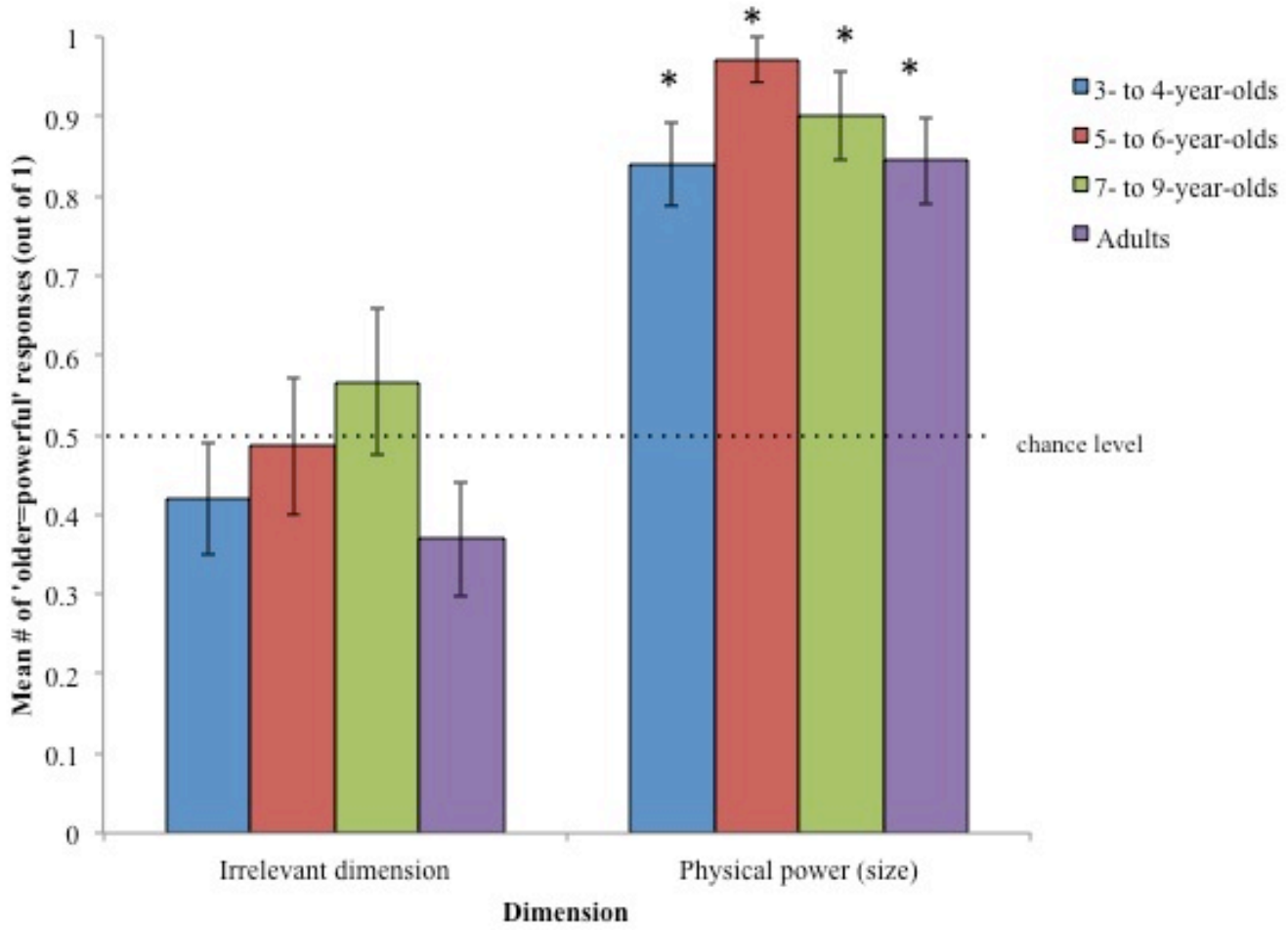


Figure 9. (Study 5) Mean number of times participants judged the powerful character to be male for each dimension, by age group in choice questions ("Who is the boy/girl?"). Score for each dimension is a composite sum of the scores of the two relevant vignettes. Scores that are significantly above chance are indicated (* $p < .05$).

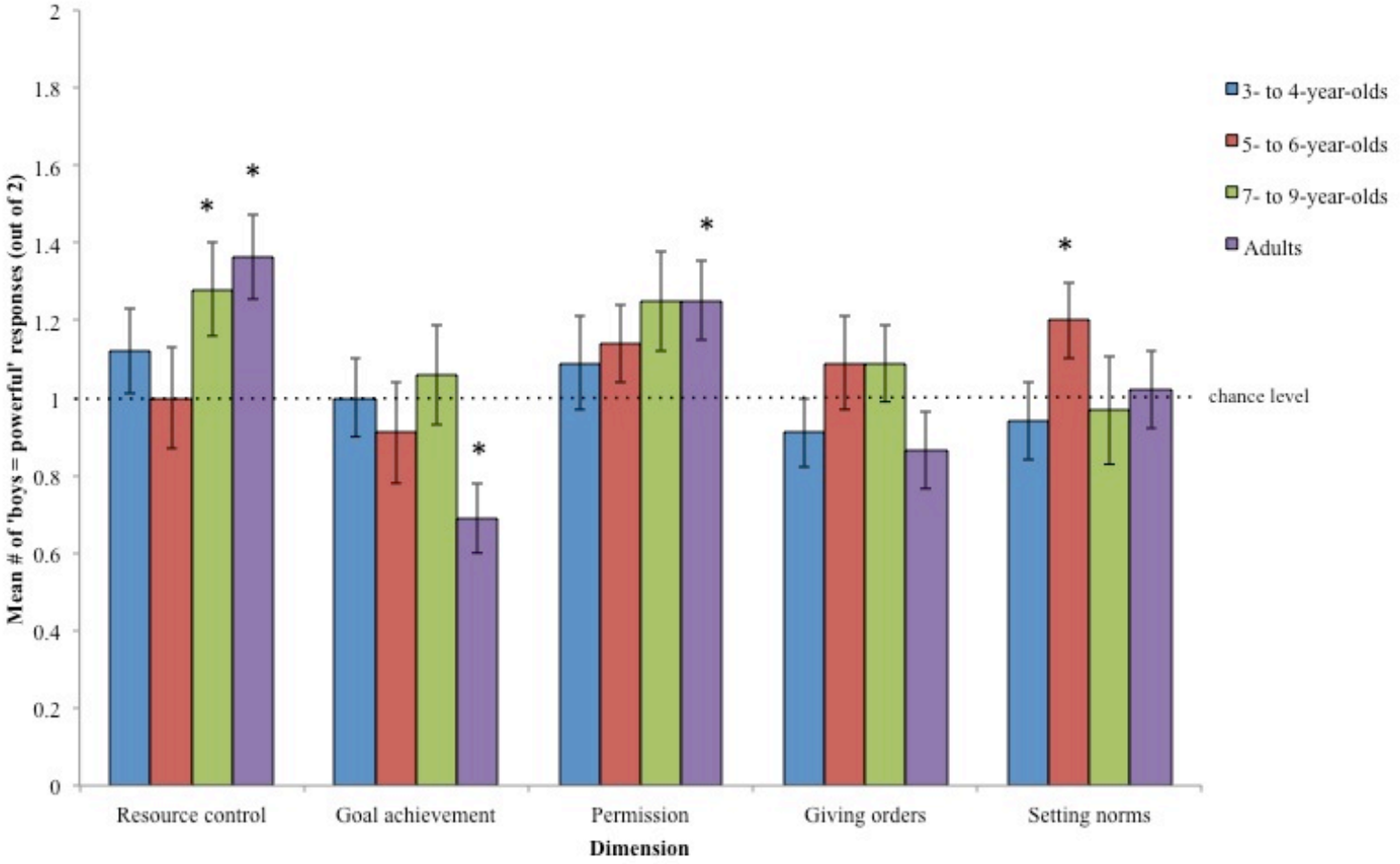
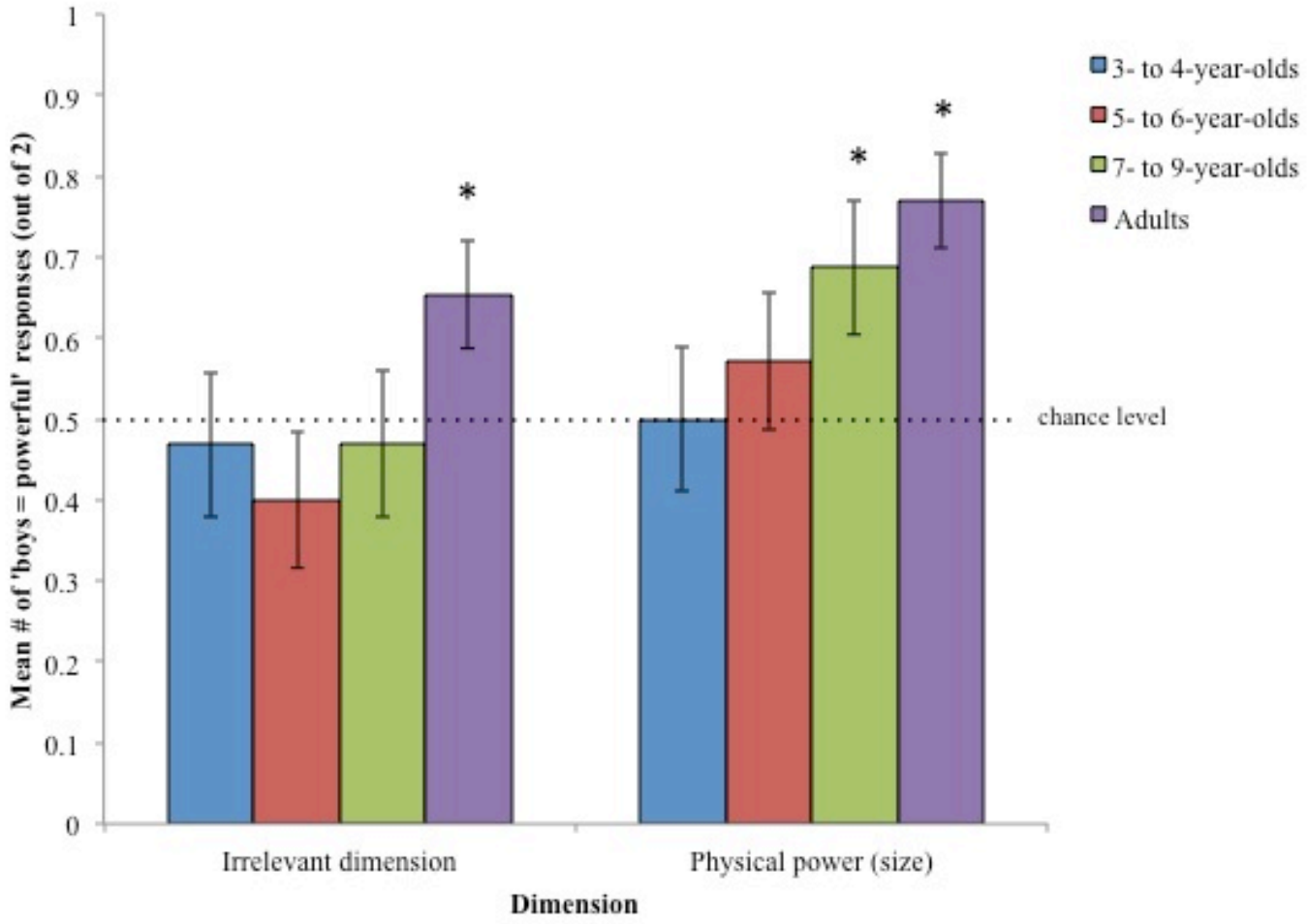


Figure 10. (Study 5) Mean scores for each control trial, by age group. Scores that are significantly above chance are indicated (* $p < .05$).



Appendix A

List of vignettes used for each dimension in Study 1. Each vignette began with the statement, "This is a story about two girls/boys called [name of first character] and [name of second character]." After each vignette, participants were asked, "Who has more power: [name of first character] or [name of second character], or are they the same?"

Resource Control

1. Toy Truck: "This story is about two girls/boys called Zorp and Gorp. Zorp and Gorp went to the sandbox. In the sandbox, there was only one toy truck. Both Zorp and Gorp wanted to play with the toy truck. Gorp played with the truck, and Zorp watched."
2. Candy: "Twip and Kwip were at a party. At the party, there were four candy bars. Twip and Kwip both reached for the candy bars. Twip got three candy bars, and Kwip got one candy bar."

Achieving Goals

1. Bridge: "Jeggie and Feggie were standing on different ends of the bridge. They both wanted to cross to the other end of the bridge. But the bridge was only wide enough for one person. So, when Jeggie and Feggie tried to cross at the same time, they got stuck in the middle. Jeggie went back off the bridge and moved to the side, and Feggie crossed the bridge.

2. Dessert: “Flip and Blip wanted to get dessert. Flip wanted to get ice cream, while Blip wanted to get candy. They could only go to one place. Flip and Blip went to the ice cream store and got ice cream.”

Setting Norms

1. Red T-shirt: “Dizz was telling Fizz and their friends that red is the best color and that from now on everyone should wear red. The next day, Fizz came to school wearing a red t-shirt, just like the one Dizz had been wearing. Fizz told Dizz, ‘Look at my red t-shirt.’”
2. Badge: “One day Ziggy came to school wearing a brand new badge. Ziggy showed Tiggy and their friends the badge and said ‘Look at my new badge.’ The next day, Tiggy came to school wearing the same badge that Ziggy was wearing.”

Giving Orders

1. Blocks: “Rafyy and Zaffy were playing with blocks. Raffy was telling Zaffy what to build. Raffy told Zaffy to build a house, and Zaffy built a house.”
2. Clean-up: “It was clean up time for Vip and Pip. Pip told Vip to pick up all the toys. Vip picked up all the toys, while Pip watched.”

Giving/Denying Permission

1. Ball (giving permission): “Grup was playing with a ball. Trup asked Grup, ‘Can I play too?’ Grup told Trup, ‘Yes, you can.’”
2. Castle (denying permission): “Wug and Lug were out on the playground. Lug was standing inside the toy castle, and Wug was standing inside the toy castle. Wug asked Lug, ‘Can I come inside the castle?’ Lug said to Wug, ‘No, you cannot.’”

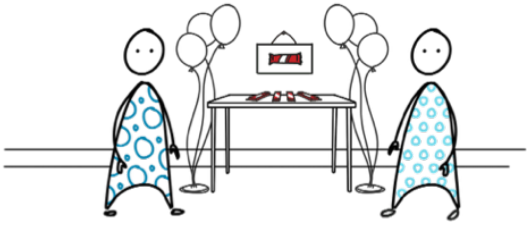
Controls

1. Irrelevant dimension: “Jiddle and Giddle were drawing pictures. Jiddle drew a triangle, and Giddle drew a circle.”
2. Physical power: “Bibby and Dippy wanted to lift these heavy bowling balls. Bibby and Dippy were both able to lift the heavy balls above their heads. After a while, Dippy couldn’t carry the ball anymore and dropped it, but Bibby kept on holding it up.”

Appendix B

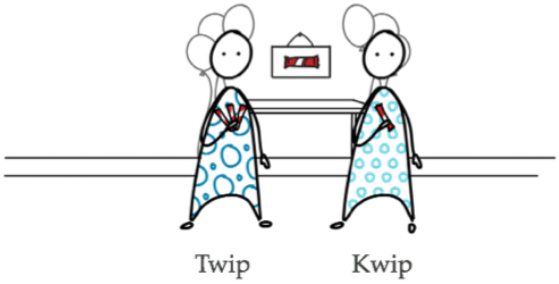
Sample vignette for Study 1.

1. This story is about two girls called Twip and Kwip.
Twip and Kwip were at a party.
At the party, there were 4 candy bars.

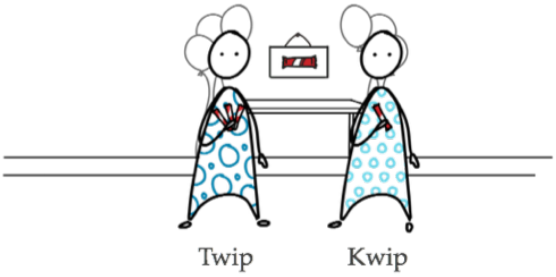


2. Twip and Kwip both reached for the candy bars.

3. Twip got 3 candy bars, and Kwip got 1 candy bar.



4.



Who is in charge: Twip or Kwip?

Twip ○ Kwip ○

Appendix C

Changed Items for Study 2.

1. Goal achievement (Bridge) vignette adjusted to emphasize urgency of desires: "Jeggie and Feggie were standing on different ends of the bridge. They both needed to cross to the other end of the bridge right away. But, the bridge was only wide enough for one person. So, when Jeggie and Feggie tried to cross at the same time, they got stuck in the middle. Jeggie went back off the bridge and moved to the side, and Feggie crossed the bridge."
2. Giving Permission item changed as a second Denying Permission item, "Ball": "Grup was playing with a ball. Trup asked Grup, 'Can I play too?' Grup told Trup, 'No, you cannot.'"
3. Implicit Norm-Setting item changed as a second Explicit Norm-Setting item, "Badge": "One day Ziggy came to school wearing a brand new badge. Ziggy showed Tiggy and their friends the badge and said 'Look at my new badge. From now on, everyone should wear the same badge.' The next day, Tiggy came to school wearing the same badge that Ziggy had been wearing."
4. Irrelevant control dimension: "Jiddle and Giddle were drawing pictures. Jiddle drew an orange house with a yellow roof, and Giddle drew a yellow house with an orange roof."
5. Physical power control dimension: "Dippy and Bibby are in the same class. Dippy is taller, and Bibby is shorter."

Appendix D

Scripts used for vignettes in Study 3, describing benevolent power.

Resource Control:

1. Toy truck: Zorp and Gorp went to the sandbox. In the sandbox, there was only one toy truck. Both Zorp and Gorp wanted to play with the toy truck. Zorp took the truck and gave the truck to Gorp. Gorp played with the truck and Zorp watched.
2. Candy bar: Twip and Kwip were at a party. At the party, there were 4 candy bars. Twip and Kwip both reached for the candy bars. Twip got all 4 candy bars. Then, Twip gave Kwip 2 candy bars, so that they both had two candy bars.

Goal Achievement:

1. Bridge: Jeggie and Feggie were standing on different ends of the bridge. They both needed to cross to the other end of the bridge right away. But the bridge was only wide enough for one person. So, when Jeggie and Feggie tried to cross at the same time, they got stuck in the middle. Jeggie said to Feggie, “Here, you can go first.” Jeggie went back off the bridge and moved to the side, and Feggie crossed the bridge.
2. Dessert: Flip and Blip wanted to get dessert. Flip wanted to get ice cream, while Blip wanted to get candy. They could only go to one place. Blip told Flip, “Okay, we can get ice cream if you want.” Flip and Blip went to the ice cream store and got ice cream.

Permission:

1. Ball: Grup was playing with a ball. Trup asked Grup, “Can I play too?” Grup told Trup, “Yes, you can.”

2. Castle: Wug and Lug were out in the playground. Lug was standing inside the toy castle, Wug was standing outside the toy castle. Wug asked Lug, “Can I come inside the castle?” Lug said to Wug, “Yes, you can.”

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