SEARCHING FOR THE DEVELOPMENTAL ORIGINS OF FAIRNESS

BY

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DISSERTATION

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ABSTRACT

Six experiments addressed two major questions related to the development of infants’ concern for fairness: 1) at what age do infants first show a concern for fairness in terms of how objects should be distributed? and 2) how does group membership influence infants’ expectations about how objects should be distributed? In Experiment 1, 9-month-olds expected an experimenter to divide two items equally, as opposed to unequally, between two individuals. Infants held no particular expectation when the individuals were replaced with inert objects, or when the experimenter simply removed covers in front of the individuals to reveal the items (instead of distributing them). In Experiment 2, these findings were extended to 4-month-olds who also expected an experimenter to divide two items equally between two recipients when they were animate but not when they were inert or when the experimenter removed covers to reveal the items. In Experiment 3, 19-month-olds expected a distributor to divide two items equally between two similar individuals who belonged to a different group. In Experiment 4, 19-month-olds expected a distributor, who belonged to the same group as one of two potential recipients, to favor his ingroup member when he had only two items to divide. Infants found it unexpected when the distributor divided the items equally or when he gave both objects to the outgroup individual. In Experiment 5, the distributor had three toys to divide (instead of two) and 19-month-olds now no longer found it unexpected when the distributor gave one object to each recipient. In Experiment 6, 19-month-olds expected an experimenter who had many new markers to replace the broken marker of her ingroup member but not that of an outgroup individual who also had a broken marker. In combination, these results provide evidence that 1) infants in the first year of life already expect fair allocations and 2) by the
second year of life, infants consider ingroup loyalty as well as fairness when reasoning about resource allocations: at 19 months, infants privilege favoring the ingroup over fairness when resources are either scarce or needed by the ingroup to accomplish some tasks.
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CHAPTER 1

INTRODUCTION

In my dissertation, I will address two major questions related to the development of infants’ concern for fairness: 1) at what age do infants first show a concern for fairness in terms of how objects should be distributed? (Chapter 2); and 2) how does group membership influence infants’ expectations about how objects should be distributed (Chapter 3)?

1.1 BROAD APPROACHES TO MORALITY

Before I address the specific moral principle of fairness, I will provide some background about moral development research more broadly. Despite mankind’s millennia of wonderings about human morality, modern thinkers have reached no more of a consensus about the origins or causes of morality. While many theories have been proposed and even tested, there is still a great divide between those who argue that morality is something we acquire through parental practices and other socialization processes (e.g., Eisenberg, Fabes, & Spinrad, 2006; Malti, Eisenberg, Kim, & Buchmann, 2013), those who argue that morality is something we construct by interacting with peers and other individuals (Turiel, 2006; Turiel, 2008), and those who argue that morality is an evolved adaptation (e.g., Brewer, 1999; Dupoux & Jacob, 2007; Dwyer, 2006; Fiske, 2004; Gintis, Henrich, Bowles, Boyd, & Fehr 2008; Greene, 2005; Haidt, 2001; Jackendoff, 2007;
Nichols, 2005; Mikhail, 2007; Premack, 2007; Sigmund, Fehr, & Novak, 2002; Sripada & Stich, 2006).

Nancy Eisenberg and her colleagues argue that parenting is the primary factor that determines whether or not children develop appropriate sympathetic responses, moral emotional responses, and moral reasoning abilities (e.g., Malti, Eisenberg, Kim, & Buchmann, 2013). More specifically they argue that supportive parenting, defined as a combination of warmth and responsiveness, leads to an increase in other-oriented moral emotions (e.g., sympathy) as well as more advanced moral reasoning abilities.

Elliot Turiel (2008) on the other hand, takes a more cognitive stance and argues for a domain theory of development, proposing that even young children can distinguish between three types of domains: moral, social-conventional, and personal. According to Turiel, children learn how to make judgments separately in each domain. What makes the moral domain distinct is that judgments are based on, “avoiding harm, promoting people’s welfare, ensuring fairness, and protecting rights”, whereas judgments related to social conventions are specific to institutions or groups and are contingent on rules and authority (p. 137). Turiel argues that children learn how to make judgments in the social-conventional domain primarily from their parents and other adults, but learn how to make appropriate judgments in the moral domain both from adults and from their own concern for others.

Among proponents of the evolved-adaptation approach, there are many viewpoints on how best to characterize humans’ ability to reason intuitively about sociomoral interactions. There are at least two dimensions that are useful in distinguishing between the different accounts. One dimension involves whether causality is attributed to affective
mechanisms (e.g., emotions) or to cognitive mechanisms (e.g., concepts, principles or heuristics) and a second dimension is whether innateness is limited to structural organization or includes content as well.

For example, Nichols (2005) falls on the affective end of the first dimension and the structural organization of the second. He argues that we have innate affective systems that respond to the suffering of others; the resulting emotional responses then gradually shape relevant cognitive structures so that they (eventually) contain rules telling us not to harm others if we can help it. Like Nichols, Sripada and Stitch (2006) fall toward the structural organization end on the second dimension; however, they stand closer to the cognitive end on the first dimension. They argue that we have a norm-detection mechanism that allows us to recognize the specific types of rules or norms that prevail in our social environment. Once a norm has been acquired, the mechanism produces intrinsic motivation to comply with it, which includes punishing individuals who fail to comply with it.

Haidt (2001, 2008) falls somewhere in between affective and cognitive on the first dimension and closer to innate content on the second dimension. Haidt proposes a theory of moral intuitions, which he defines as quick, automatic, affectively valenced evaluations (or judgments) that appear in the conscious mind independently of any conscious reasoning or weighing of evidence (Haidt, 2001). Haidt insists that he is not drawing a distinction between emotion and cognition, but rather between intuition and reasoning and argues that moral intuitions are a type of cognition that happen outside of conscious awareness and when they appear in our consciousness we call them moral judgments. In more recent papers, Haidt argues that these moral intuitions come from five innate moral foundations, which include fairness and harm as well as authority, loyalty, and purity
Dupoux and Jacob (2007) present a more integrated mechanism of moral reasoning, falling slightly closer to the cognitive and innate-content end of the dimensions. They argue that when we witness a social interaction, we first form a mental representation of the causal, intentional, and emotional aspects of the situation, which then results in one or more automatic intuitions. If there are multiple intuitions that conflict with one another, the (existing) moral faculty engages in a process of adjudication, which eventually leads to a judgment and finally, this judgment leads to explicit beliefs/justifications about the relevant situation.

Fiske (1992, 2004) proposes a relational model with specific innate content and therefore falls even closer to the cognitive and innate content ends of the two dimensions. Fiske argues that there are four fundamental ways that people relate to each other: communal sharing (individuals belonging to the same category should be treated equally), authority ranking, equality matching (eye-for-an-eye), and market pricing. Fiske argues that these rules are “endogenous products of the human mind, generated by universally shared models of and for social relations.” (Fiske, 1992, p. 690). Finally, Premack (2007) falls closest to the cognitive and innate content ends of each dimension; he proposes specific innate sociomoral principles, which include, “deal fairly with others, care for those who are in distress, and do not harm the other one” (p. 161). In my work, I adopt this last principle-based conception of sociomoral reasoning as my working hypothesis, because it is consistent with much of what we already know about how infants reason about physical and psychological events.
There are several key assumptions that pertain to this principle-based conception (or cognitive-innate-content-based conception, more broadly speaking) of sociomoral reasoning that are worth mentioning here (e.g., Brewer, 1999; Dwyer, 2009; Fiske, 1992; Fiske, 2004; Haidt, 2008, 2013; Jackendoff, 2007; Premack & Premack, 2003; Sigmund et al., 2002). First, humans are born with a set of abstract sociomoral principles that evolved during the millions of years our ancestors lived in small groups of hunter-gatherers, where survival depended on cooperation. Second, the principles determine what is obligatory, permissible, and forbidden in social interactions, not what is virtuous. And third, different cultures rank-order and elaborate the principles in different ways, which helps explain the diverse moral landscape that exists in the world today.

1.2 PRIOR RESEARCH ON FAIRNESS

There are currently five potential sociomoral principles that infancy researchers have begun to study: *fairness*, *harm*, *ingroup love*, *authority* and *reciprocity* (for a review, see Baillargeon et al., 2015). My work looks primarily at the principle of fairness in terms of how resources should be distributed. In Chapter 3, however, I also examine how the principle of ingroup-love interacts with the principle of fairness.

A. Background research with children ages 3 and older

Two main types of tasks have been used to examine children’s expectations about the distribution of goods: *first-party tasks*, where the child is a potential recipient of the goods (e.g., Fehr, Bernhard & Rockenbach, 2008; Rochat et al., 2009), and *third-party tasks* where the child is not a potential recipient (e.g., Olson & Spelke, 2008; Rochat et al., 2009).
Within these two types of tasks, there are other variations such as: whether the recipients and goods are real (e.g., Gerson & Damon, 1978; Ugurel-Semin, 1952; Warneken et al., 2010) or hypothetical (e.g., Gerson & Damon, 1978; Peterson, Peterson & McDonald, 1975; Thomson & Jones, 2005), and whether the goods have no relation to work or merit (i.e., windfall) (Fehr et al., 2008; Gummerum, Hanoch, Keller, Parsons, & Hummel, 2010; Rochat et al., 2009) or are rewards contingent on work or merit (e.g., Lane & Coon, 1972; Lerner, 1974; Leventhal & Anderson, 1970; Sigelman & Waitzman, 1991). These types of studies have also been run in a variety of cultures, including Asian cultures (e.g., Singh et al., 2002; Tsutsu, 2010; Wong & Nunes, 2003) as well as in remote and indigenous societies around the world (e.g., Rochat et al., 2009).

Many studies, using both types of tasks (first- and third-party) as well as both types of distributions (windfall and rewards), have found that children 5 years and older show sensitivity to fairness in these contexts (e.g., Damon, 1975; Enright, Franklin, & Manheim, 1980; Fehr et al., 2008; Gummerum et al., 2010; Moore, 2009; Rochat et al., 2009; Thompson, Barresi, & Moore, 1997; Tsutsu, 2010; Ugurel-Semin, 1952).

However, when we consider younger children, 3 to 4 years old, the results have been more mixed. Studies using first-party tasks have generally been negative: When preschoolers are asked to divide windfall resources or rewards between themselves and others, they tend to act selfishly, keeping more for themselves and showing signs of inequity aversion only when they are the disadvantaged party (e.g., Damon, 1975; Fehr et al., 2008; Gummerum et al., 2010; Hook & Cook, 1979; LoBue, Nishida, Chiong, DeLoache, & Haidt, 2011; McCrink, Bloom, & Santos, 2010; Rochat et al., 2009). For example, in one experiment, 3- to 4-year-olds chose how sweets should be shared between themselves and
an anonymous child (Fehr et al., 2008). They chose between an allocation of one sweet for themselves and one sweet for their partner (1,1) and an allocation of (1,0), (1,2), or (2,0), depending on condition. The children chose randomly in the first two conditions (they received one sweet either way and did not much consider what their partner would get), and they chose the (2,0) allocation in the last condition, to maximize their own gain.

In contrast to studies using first-party tasks, those that have tested 3- to 4-year-olds with third-party tasks have tended to be more positive and suggest that, at least under some conditions, preschoolers expect resources and rewards to be divided fairly among recipients (e.g., Baumard, Mascaro & Chevallier, 2012; Olson & Spelke, 2008; Peterson et al., 1975; Thomson & Jones, 2005). For example, Olson and Spelke (2008), showed 3.5-year-olds five dolls; one was identified as the protagonist, and the other four were identified as the protagonist’s siblings and friends or as strangers. When the children were asked to help the protagonist allocate four items, they divided the items equally among the other dolls, regardless of how they were identified. In another third-party experiment, Baumard et al. (2012) told 3-and 4-year-olds a simple story illustrated with pictures. In the story, Amélie and Hélène began to bake cookies together, but soon after they began Hélène stopped working and began to play, leaving Amélie to finish on her own. In one condition, children were shown a large and a small cookie and asked who should receive the large cookie. Both 3- and 4-year-olds were reliably more likely to give the large cookie to Amélie (the worker) than to Hélène (the slacker). In another condition, children were shown three cookies and asked to distribute them; at each age, children were reliably more likely to give two cookies to the worker than to the slacker.
The results of the third-party studies presented so far can be used to support each of the three broad approaches to moral development discussed above: socialization, cognitive construction and evolved adaptation. For example, proponents of the socialization view might say that children as young as 3.5 years succeed in third-party tasks because they have had sufficient time to learn from their social world that fairness should prevail in these situations. Similarly, proponents of the cognitive construction view might argue that by 3.5 years children have already constructed some understanding of moral rules, particularly fairness. Finally, proponents of the evolved adaptation view might suggest that 3.5-year-olds succeed in these third-party tasks because they have an innate understanding of fairness they can apply in these situations. It is also likely that proponents of all three views would give similar explanations (involving lack of inhibition and self-control) as to why these same children fail in first-party tasks. Since all three views offer reasonable explanations for why 3.5-year-olds succeed in third-party tasks, in order to begin to distinguish between the different views, in my own work I look at infants using third-party situations.

B. Background research with infants in the second year of life

Building on the positive results of the third-party tasks described in the last section, several researchers have begun to look at fairness in the second year of life (Geraci & Surian, 2011; Schmidt & Sommerville, 2011; Sloane, Baillargeon, & Premack, 2012). The results of these studies show: 1) by 15 to 19 months of age, infants expect a distributor to divide windfall resources fairly (Schmidt & Sommerville, 2011; Sloane et al., 2012), 2) infants prefer a fair distributor over an unfair distributor (Geraci & Surian, 2011), and 3) by
21 months, infants expect an experimenter to distribute rewards equally between two individuals when both have worked, but not when one has worked while the other has chosen not to (Sloane et al., 2012).

In the study of Sloane et al., (2012), 19-month-olds were shown live events in which an experimenter divided two objects (toys, cookies or cars) between two identical animated puppet giraffes. On alternate trials for three pairs of trials, the infants saw an equal allocation (equal event) where the experimenter gave one object to each giraffe and an unequal allocation (unequal event) where she gave both objects to one giraffe and none to the other. The infants looked reliably longer at the final paused scene in the unequal than in the equal event, suggesting that by 19 months, infants expect a distributor to divide resources fairly between two similar recipients. This conclusion was supported by two control conditions. In one, the giraffes were inanimate (they never moved or talked), and infants looked about equally at the two test events. In the other control condition, instead of bringing in and distributing the two objects in each trial, the experimenter removed covers resting over the giraffes’ placemats to reveal the objects; infants again looked equally at the two test events, suggesting that they did not merely expect similar individuals to have similar numbers of items.

In the study by Geraci and Surian (2011) 16-month-old infants watched computer-animated events involving five different characters: two distributors (a bear and a lion), two recipients (a donkey and a cow), and one observer (a chicken). The infants first saw an equal event in two trials and an unequal event in two trials. In the equal event, the “fair” distributor gave one disc to each of two recipients while the observer watched; in the unequal event, the “unfair” distributor gave both discs to the same recipient. At the end of
the session, the infants also received a choice task (modeled after Hamlin et al., 2007) in which they were presented with pictures of the fair and unfair distributors and encouraged to pick up the picture they wanted. Results indicated that, although the infants tended to look equally at the equal and unequal events (I return to this issue in Chapter 2), they were reliably more likely to reach for the fair than the unfair distributor. This preference was eliminated in a control condition where the recipients were inanimate artifacts rather than animate characters. In combination, these results indicate that by 16 months, infants already show sensitivity to fairness, and this sensitivity guides their social preferences.

Schmidt and Sommerville (2011) showed 15-month-olds videotaped events in which a female distributor divided either crackers or milk between two female recipients. In the cracker scenario, for example, the distributor held up a clear bowl with four crackers and the recipients slid their empty plates toward her. The distributor then placed crackers on the plates; however, the infants were unable to see how she distributed the crackers because her actions were blacked out (a screen appeared on the computer monitor that occluded the bowl and plates). Next, the infants saw two still frames (in counterbalanced order) in which the empty bowl rested in front of the distributor while the two recipients looked down at their plates; in the equal frame, each recipient had two crackers, and in the unequal frame, one recipient had one cracker and the other recipient had three crackers. The infants looked reliably longer at the unequal than at the equal frame, suggesting that they expected the distributor not only to give some resources to each recipient, but to divide them equally between the two recipients. This effect was not observed in additional control trials where the infants saw the same still frames without the distributor and
Recipients. These results suggest that by 15 months, infants detect a violation even when both recipients are given some objects, but in unequal amounts.

In combination, the results presented so far suggest that 15- to 19-month-olds expect distributors to divide resources fairly and prefer “fair” over “unfair” distributors. However, from these results alone, it is not clear what developmental processes are driving these expectations. For example, by 15 months, it is possible that infants possess a simple rule that everyone should always be treated equally, independent of context. It is also possible that infants are more sophisticated and can take the context of a situation into account. One way to sort out whether infants simply expect everyone to be treated equally or whether they have a context-dependent understanding of fairness is to look at their expectations in situations that involve rewarding others based on effort. Evidence that infants detect a violation when an individual who does not deserve a reward receives one anyway would argue against the conclusion that infants simply expect everyone to be treated equally.

To address this issue, Sloane, et al. (2012), presented 21-month-olds with a scenario in which a female experimenter asked two female individuals to put away toys in clear boxes. In the explicit condition, the experimenter told the individuals they would receive a reward (a smiley-face sticker) if they complied. In the implicit condition, the experimenter did not mention the rewards beforehand in order to determine whether infants would hold expectations about the dispensation of rewards even in the absence of an explicit contract. In each condition, infants received a single test trial in which they saw either one individual work while the other played (one-works event) or both individuals work (both-work event). We reasoned that if infants looked reliably longer when shown the one-works as
opposed to the both-work event, this would suggest that 21-month-olds expect a distributor to reward individuals according to their efforts; and that is exactly what we found. Infants were also tested in a control condition identical to the explicit condition except that the individuals' boxes were not transparent, making it impossible for the experimenter to determine who had worked and who had not. This control condition served to rule out the possibility that the infants in the explicit and implicit conditions looked reliably longer at the one-works event not because they were puzzled that the experimenter rewarded the worker and the slacker equally (even though she knew, from inspecting the boxes, that the slacker had done no work), but because they were responding to tangential aspects of the event (e.g., they were puzzled that the slacker did no work, or they preferred to see all the toys in one box). The most compelling aspect of this finding, in combination with the findings presented above, is the implication that by the second year of life, infants already have a nuanced sense of fairness that is equity based and enables them to take the context of a situation into account (i.e., they don't simply expect all objects to be distributed equally). While these results do not provide definitive evidence that an evolved framework guides early sociomoral reasoning, they certainly are consistent with such an account.

In my research, I build on these results: In Chapter 2, I ask how infants in the first year of life expect windfall resources to be distributed. Testing infants in the first year of life is a critical way to evaluate competing views of moral development, because the younger infants are, the less likely it becomes that their expectations are due to social learning or to cognitive construction (given that they have spent very little time on earth
and lack much experience in the social world) and the more likely it becomes that their expectations are guided by innate principles and concepts.

1.3 INGROUP LOVE

Another important aspect of moral development that interacts with fairness is how we preferentially treat members of our own group. The *ingroup* principle states: Members of a social group should act in ways that sustain the group (e.g., Brewer, 1999; Haidt & Joseph, 2007; Tajfel et al., 1971). The ingroup principle has two corollaries, *ingroup loyalty* and *ingroup support*. Ingroup loyalty dictates that in situations involving ingroup and outgroup individuals, one should (1) *prefer* and *align with* ingroup as opposed to outgroup individuals, (2) *protect* ingroup individuals who are threatened by outgroup aggressors, and (3) display *favoritism* toward ingroup over outgroup individuals (e.g., when distributing resources). Ingroup support dictates that when interacting with ingroup individuals, one should (1) engage in prosocial actions such as *helping* ingroup members in need of assistance, *comforting* ingroup members in distress, and *sharing* resources with ingroup members, and (2) limit negative interactions within the ingroup by *refraining* from unprovoked negative actions, *curbing* retaliatory actions, and engaging in *social acting*, the everyday social pretense that adults engage in – in the form of white lies, false cheer, and so on – to avoid hurtful or awkward interactions with ingroup members (e.g., Baillargeon et al., 2013; Yang & Baillargeon, 2013).

Here, I am interested in determining at what age infants begin to show sensitivity to ingroups and whether or not they posses expectations of ingroup loyalty that might interact with their expectations of fairness. Many studies with children ages 3 to 10 have
found that they do show favoritism toward ingroup members regardless of whether or not the group is a real group (e.g., based on race or gender) or a minimal group (e.g., based on an arbitrary factor such as tee-shirt color). For example, Olson and Spelke (2008) found that when resources are scarce, children as young as 3.5 years will give more to friends and family than to strangers. However, very little research has been done with children younger than 3.5 years, so many questions remain to be answered: For example, do infants possess an expectation of ingroup loyalty? If yes, how and when do they learn to rank-order fairness and ingroup loyalty in situations where both principles compete and suggest different courses of actions?

It seems possible that some or all of the different approaches to moral development (i.e., socialization, cognitive construction, and evolved adaptation) play a role in the development of ingroup loyalty. Since we are not yet able to definitively answer the questions raised above, it is possible, for example, that infants do come into this world with an expectation of ingroup loyalty, but that socialization plays a key role in teaching them, in conflicting situations, when to follow the principle of ingroup loyalty and when to follow the principle of fairness. It is also possible that infants have to develop advanced cognitive processes to reason about complex situations where ingroup loyalty and fairness interact, such as when a distributor has numerous objects to divide between ingroup and outgroup individuals.

In Chapter 3, I will attempt to answer some of these questions by exploring how the principle of ingroup loyalty might interact with the principle of fairness and in what ways the different approaches to morality might explain developments in infants’ responses.
Here I will test infants in the second year of life to determine how their expectations about fairness change in contexts where it is pitted against ingroup loyalty.
CHAPTER 2

EXPECTATIONS OF FAIRNESS IN THE FIRST YEAR OF LIFE

2.1 EXPERIMENT 1 (9-MONTH-OLDS)

Recently, there have been a handful of studies that have looked at infants’ sensitivity to fairness in the first year of life (e.g., Geraci & Surian, 2011; Meristo & Surian, 2013; Sommerville et al., 2013). However, these results have been mixed, giving rise to two diverging hypotheses concerning the early development of fairness. The mixed results with young infants have come from three different resource-allocation tasks. In a one-distributor task, 12-month-olds watched events in which a single distributor divided four items between two recipients (Sommerville et al., 2013). In the unfair-allocation event, the distributor gave three items to one recipient and one item to the other recipient; in the fair-allocation event, the distributor gave two items to each recipient. Infants looked about equally at the two events. In a two-distributor task, 11-month-olds watched events in which two different distributors took turns dividing two items between two recipients (Geraci & Surian, 2011). In the unfair-distributor event, one distributor gave two items to one recipient and none to the other recipient; in the fair-distributor event, the other distributor gave one item to each recipient. Here again, infants looked about equally at the two events. Finally, in a preference task (Meristo & Surian, 2013), 10-month-olds first saw fair- and unfair-distributor events that also involved a bystander who witnessed the distributors’ actions. Next, infants watched events in which the bystander brought in one item and gave it to either the unfair distributor (prefers-unfair event) or the fair distributor (prefers-fair event). Infants looked reliably longer at the prefers-unfair than at the prefers-fair event, and this effect was eliminated when the bystander did not witness the distributors’ actions.
The preceding results are compatible with two diverging hypotheses concerning early responses to fairness. One hypothesis, termed the *late-emergence* hypothesis, holds that infants in the first year of life possess no expectation about whether a distributor should divide resources fairly or unfairly (this is suggested by the negative results obtained with 12- and 11-month-olds in the one- and two-distributor tasks). As they observe the social world, however, infants rapidly learn that being a fair distributor confers social advantages that being an unfair distributor does not: whereas fair distributors tend to be preferred or rewarded, unfair distributors tend to be shunned or punished (this is suggested by the positive results obtained with 10-month-olds in the preference task). These observations gradually lead infants, sometime after their first birthday, to expect individuals to produce fair as opposed to unfair allocations (this is suggested by the positive results that have been obtained with infants ages 15-19 months in one-distributor tasks; Schmidt & Sommerville, 2011; Sloane et al., 2012).

The other hypothesis, termed the *early-emergence* hypothesis, assumes that infants in the first year of life do expect distributors to act fairly, but can demonstrate this expectation only under limited conditions. In this view, the negative results described above are open to alternative interpretations that preserve the possibility of an early emerging sensitivity to fairness. First, consider the negative results of the one-distributor task (Sommerville et al., 2013). These results could stem from performance limitations: perhaps 12-month-olds expect fair allocations, but for ancillary reasons have difficulty tracking allocations involving as many as four items to two potential recipients. Next, consider the negative results of the two-distributor task (Geraci & Surian, 2011). Although this task involved simple two-item allocations, the introduction of a second distributor
could have caused interpretive ambiguities. In a one-distributor task, the same distributor produces the fair and unfair allocations on alternate trials, so that a justification for the unfair allocation is hard to come by (what reason could the distributor have to treat the recipients fairly in one trial but unfairly in the next?). In a two-distributor task, however, different distributors produce the fair and unfair allocations, so that an explanation for the unfair allocation becomes possible: perhaps the shunned recipient previously acted negatively toward the unfair distributor, whose actions are thus retaliatory (e.g., Dunfield & Kuhlmeier, 2010; Hamlin et al., 2011); or perhaps the unfair distributor is employing a strategy of alternating between recipients (e.g., two items for this recipient, then two items for that recipient) and is incompetently losing track of who has received what across trials (e.g., Chow & Poulin-Dubois, 2009; Zmyj et al., 2010).

Is the late-emergence or the early-emergence hypothesis correct? To address this question, I tested 9-month-olds with a simple two-item one-distributor task: an experimenter divided two cookies either equally or unequally between two animated puppet penguins. According to the late-emergence hypothesis, results should be negative, because young infants still lack any expectation about whether a distributor should divide resources fairly or unfairly. According to the early-emergence hypothesis, however, results should be positive, because even young infants ought to expect fairness in the simple situation used here. Positive results would thus (1) support the early-emergence hypothesis, (2) provide the first demonstration that infants in the first year of life already expect a distributor to divide resources fairly, (3) constrain theoretical accounts of the developmental origins of fairness, and (4) inform the methodological assessment of fairness in early infancy.
Design

Infants were assigned to an experimental, an inanimate-control, or a cover-control condition (this task was adapted from Sloane et al., (2012); as was mentioned in Chapter 1, they obtained positive results with 19-month-olds). Infants in the experimental condition (Fig. 1) received one recipient-familiarization trial and two test trials; each trial had an initial and a final phase. At the start of the recipient-familiarization trial, two identical puppet penguins (placed on the hands of a hidden female assistant) protruded from openings in the back wall of a puppet-stage apparatus; in front of each penguin was a small placemat. During the initial (12-s) phase of the trial, the penguins “danced” by tilting alternately left and right, changing side every second. During the final phase of the trial, the penguins paused upright, and infants watched this paused scene until the trial ended. The recipient-familiarization trial thus served to introduce the penguins. During the initial (26-s) phase of each test trial, the penguins danced until a female experimenter opened a curtained window in the right wall of the apparatus; the penguins then turned toward the experimenter, as though to observe her actions. The experimenter brought in a plate with two identical cookies and announced, “I have cookies!”; the penguins responded simultaneously, “Yay, yay!” (in distinct voices; the assistant and a female supervisor standing next to her spoke these utterances). Next, the experimenter placed one cookie on the placemat in front of one penguin; which penguin received the first cookie was counterbalanced across infants. The experimenter then placed the other cookie in front of either the same penguin (unequal event) or the other penguin (equal event); the order of the two events was counterbalanced. Finally, the experimenter left with her empty plate,
and the penguins looked down at their placemats and paused. During the final phase of each trial, infants watched this paused scene until the trial ended.

The inanimate-control condition (Fig. 2) served to rule out low-level interpretations such as baseline preferences for asymmetrical displays or for displays involving two cookies placed side by side. Infants saw events identical to those in the experimental condition except that the penguins were inanimate: they never moved or talked, but simply faced forward (they rested on hidden posts).

Finally, the cover-control condition (Fig. 3) served to rule out the possibility that infants merely expected similar individuals to have similar numbers of objects. The recipient-familiarization trial was identical to that in the experimental condition, with the animated penguins. In the initial (26-s) phase of each test trial, instead of bringing in and distributing the two cookies, the experimenter removed covers resting over the penguins’ placemats to reveal the cookies; the covers were removed one at a time, with order counterbalanced across infants. The experimenter did not speak in this condition, but the penguins greeted her (“Yay, yay!”) as she arrived. In the unequal event, the covers were removed to reveal two cookies on one placemat and none on the other; in the equal event, the covers were removed to reveal one cookie on each placemat. After the experimenter left, the penguins looked down and paused, as in the experimental condition.

We reasoned that if infants in the experimental condition looked reliably longer at the unequal than at the equal event, but infants in the inanimate- and cover-control conditions looked equally at the events, this would indicate that 9-month-olds already expect a distributor to divide two items equally between two potential recipients.
Method

Participants

Participants were 48 healthy full-term 9-month-olds, 25 male and 23 female (range = 8 months 9 days to 9 months 23 days, $M = 9$ months 3 days); 16 infants were randomly assigned to each condition. Another 5 infants were excluded because they looked the maximum time allowed in the test trials (4) or because the difference in the test looking times was over 4.5 standard deviations from the condition mean (1).

Apparatus and stimuli

The apparatus consisted of a brightly lit display booth (201.5 cm high $\times$ 102 cm wide $\times$ 58 cm deep) with a large opening (56 cm $\times$ 95 cm) in its front wall; between trials, the supervisor lowered a curtain in front of this opening. Inside the apparatus, the side walls were painted white, and the back wall and floor were covered with pastel adhesive paper.

The experimenter wore a green shirt, knelt at a window (51 cm $\times$ 38 cm) in the right wall of the apparatus, and slid a curtain to open or close the window. Another curtain behind the experimenter hid the testing room.

The two penguins were identical puppets (about 22 cm $\times$ 12 cm $\times$ 9 cm at their largest points) made of black and white furry fabric; each penguin had a large head with an orange beak. The penguins protruded from openings (each 20 cm $\times$ 12.5 cm and filled with beige felt) located 20 cm apart in the back wall of the apparatus. Centered beneath each penguin was a white placemat (1 cm $\times$ 20 cm $\times$ 13 cm). In the cover-control condition, identical tan covers (each 10 cm $\times$ 22.5 cm $\times$ 15.5 cm, with a wooden knob at the top) stood
over the placemats at the start of each test trial.

The cookies were edible vanilla sandwich cookies (each about 1 cm × 3 cm × 7 cm). In the experimental and inanimate-control conditions, the experimenter introduced the cookies on a beige ceramic plate (2.5 cm x 20 cm in diameter).

Procedure

Infants sat on a parent’s lap centered in front of the apparatus; parents were instructed to remain silent and to close their eyes during the test trials. Each infant’s looking behavior was monitored by two hidden naive observers; looking times during the initial and final phases of each trial were computed separately, using the primary observer’s responses. Interobserver agreement (calculated for each trial by determining the proportion of 100-ms intervals in which the observers agreed) averaged 93% per trial per infant.

Infants were highly attentive during the initial phases of the familiarization and test trials; across conditions, they looked, on average, for 95% of each initial phase. The final phase of each trial ended when infants (a) looked away for 2 consecutive seconds after having looked for at least 5 (familiarization) or 6 (test) cumulative seconds or (b) looked for a maximum of 45 cumulative seconds. Infants in all three conditions looked about equally during the final phase of the familiarization trial, $F(2, 45) = 1.75, p = .186$. Preliminary analyses of the final phases of the test trials revealed no significant interaction of condition and event with infant’s sex, order of the events, which penguin received the first cookie, or which cover was lifted first (cover-control condition only); the data were therefore collapsed across these latter four factors.
Results

Infants’ looking times during the final phases of the test trials (Fig. 4) were subjected to an analysis of variance (ANOVA) with condition (experimental, inanimate-control, or cover-control) as a between-subjects factor and event (unequal or equal) as a within-subjects factor. The analysis yielded only a significant Condition × Event interaction, \( F(1, 45) = 5.65, p = .007 \). Planned comparisons revealed that infants in the experimental condition looked reliably longer at the unequal (\( M = 21.9, SD = 10.8 \)) than at the equal (\( M = 14.0, SD = 8.1 \)) event, \( F(1, 45) = 14.41, p = .0004, \) Cohen’s \( d = 0.828 \); infants in the inanimate-control condition looked about equally at the unequal (\( M = 16.4, SD = 11.1 \)) and equal (\( M = 17.6, SD = 10.2 \)) events, \( F(1, 45) = 0.29, d = -0.113 \); and infants in the cover-control condition also looked about equally at the unequal (\( M = 15.9, SD = 9.8 \)) and equal (\( M = 16.0, SD = 10.2 \)) events, \( F(1, 45) = 0.002, d = -0.010 \).

Examination of individual responses indicated that 13/16 infants in the experimental condition looked longer at the unequal event (cumulative binomial probability, \( p = .011 \)), but only 6/16 infants in the inanimate-control condition (\( p = .895 \)) and 7/16 infants in the cover-control condition (\( p = .773 \)) did so. The difference between the experimental condition and the two control conditions was reliable, \( p = .013 \) (Fisher’s exact test).

Future Directions

Could the infants in the experimental condition have detected a violation in the unequal event, not because the experimenter distributed the cookies unfairly, but because
she interacted with only one of the penguins, and ignored the other? Could expectations about the social interactions (or lack thereof) of the experimenter with the potential recipients, rather than expectations about fairness, be driving the infants’ responses? In the inanimate- and cover-control conditions no such expectations are present; in the inanimate-control condition the infants looked equally regardless of how the experimenter distributed the cookies or who she interacted with and in the cover-control condition, the experimenter interacted with both penguins (as she removed each penguin’s cover) and the infants again looked equally at both events.

To examine this alternative interpretation of the results of Experiment 1, I will test additional infants in a new condition where the experimenter will engage in a social interaction with each potential recipient prior to distributing the cookies. In this modified-experimental condition, the experimenter will first lift a cover in front of each penguin to reveal empty placemats underneath. The experimenter will then give a cookie to one penguin (which penguin receives a cookie first will be counterbalanced); in the equal event she will give the second cookie to the other penguin and in the unequal event she will give the second cookie to the same penguin (the order of the events will be counterbalanced). I plan to test an additional 16 infants in this condition. If infants in this condition look reliably longer at the unequal than at the equal event, this will not only replicate the findings from the experimental condition but it will also provide evidence that 9-month-olds are responding to how the experimenter divides the cookies between the two penguins, rather than to whether she interacts with each penguin.

**Discussion**
The infants in the experimental condition expected the experimenter to divide the two cookies equally between the two penguins (and they will hopefully display the same expectation in the modified-experimental condition). This expectation was absent when the penguins were inanimate (inanimate-control condition), and when the experimenter simply removed covers to reveal the cookies (cover-control condition). Together, the results from these four conditions should provide robust evidence that 9-month-old infants already expect a distributor to divide resources equally between two similar individuals.

2.2 EXPERIMENT 2 (4-MONTH-OLDS)

To further test the early-emergence hypothesis, Experiment 2 examines 4-month-olds with a two-item one-distributor task similar to that used in Experiment 1 (with puppet Elmos instead of penguins). Infants were tested in the same three conditions used in Experiment 1: an experimental, inanimate-control, and cover-control condition. If infants as young as 4 months have an expectation of fairness, they should again look reliably longer when the experimenter gives two items to one Elmo and none to the other than when the experimenter divides the items equally, when the Elmos move and talk but not when the Elmos are inert or when covers are lifted to simply reveal the cookies underneath. Such findings would provide the strongest evidence, to date, that an expectation of fairness emerges early in human development.

Design

Although the complete design of Experiment 2 is similar to that of Experiment 1, I began by testing infants in the experimental condition to see if 4-month-olds would hold any expectations about the distribution of objects. Infants (Fig. 5) received one recipient-
familiarization trial, one experimenter-familiarization trial and one test trial; each trial had an initial and a final phase. While piloting this experiment it became clear that infants needed an additional familiarization trial and that the effect was in the first test trial, therefore infants in this experiment received an experimenter-familiarization (in addition to a recipient-familiarization) and only one test trial instead of two as in Experiment 1.

The recipient-familiarization trial was identical to that in Experiment 1; each Elmo “danced” for 12 seconds and then paused until the trial ended. During the initial (6-s) phase of the experimenter-familiarization trial, a female experimenter opened a curtained window in the right wall of the apparatus and brought in a plate with two identical cookies (the Elmos were not present in the apparatus). The experimenter set the plate of cookies down on the apparatus floor, placed her hands on the window ledge, looked down at the plate and paused. During the final phase of the trial, infants watched this paused scene until the trial ended. Since infants in this study were much younger than in Experiment 1, the added experimenter-familiarization trial served to introduce the experimenter (in addition to the introduction of the Elmos in the recipient-familiarization trial).

During the initial (27-s) phase of the test trial, the Elmos danced until the female experimenter opened her window; the Elmos then turned toward the experimenter, as though to observe her actions. The experimenter brought in a plate with two identical cookies and announced, “I have cookies!”; the Elmos responded simultaneously, “Yay, yay!”. Next, the experimenter placed one cookie on the placemat in front of one Elmo; which Elmo received the first cookie was counterbalanced across infants. The experimenter then placed the other cookie in front of either the same Elmo (unequal event) or the other Elmo (equal event); each infant saw only one test event. Finally, the experimenter left with her empty
plate, and the Elmos looked down at their placemats. During the final phase of each trial, the Elmos tilted very gently side to side (while continuing to look down at their placemats), and the infants watched this scene until the trial ended. The movement of the Elmos served to maintain the infants’ attention, since they were so young.

Additional infants were tested in an *inanimate-control* condition, which served to rule out low-level interpretations such as baseline preferences for asymmetrical displays or for displays involving two cookies placed side by side. Infants saw events identical to those in the experimental condition except that the Elmos were inanimate: they never moved or talked, but simply faced forward resting on hidden posts.

Finally, the *cover-control condition* served to rule out the possibility that infants merely expected similar individuals to have similar numbers of objects. The recipient-familiarization trial was identical to that in the experimental condition, with the animated Elmos. Infants then received a cover-familiarization trial, to introduce them to the cover and to ensure that they knew it was cover (and not a block, for instance). During the initial (11-s) phase, the experimenter entered the stage, grasped the cover (the cover was already centered on the apparatus floor when the experimenter entered) and then lifted and rotated it toward the infant, so that the infant could see inside. During the final phase, the experimenter picked up the cover, rotated it towards the baby and then set it back in its original position; she then repeated these actions until the trial ended. In the initial (26-s) phase of the test trial, instead of bringing in and distributing the two cookies, the experimenter removed covers resting over the Elmos’ placemats to reveal the cookies; the covers were removed one at a time, with order counterbalanced across infants. The experimenter did not speak in this condition, but the Elmos greeted her (“Yay, yay!”) as she
arrived. In the unequal event, the covers were removed to reveal two cookies on one placemat and none on the other; in the equal event, the covers were removed to reveal one cookie on each placemat. After the experimenter left, the penguins looked down and paused, as in the experimental condition.

We reasoned that if infants in the experimental condition who saw the unequal event look reliably longer than infants who saw the equal event, but infants in the inanimate- and cover-control conditions look equally regardless of which event they see, this will indicate that infants as young as 4 months of age already expect a distributor to divide two items equally between two potential recipients.

**Method**

*Participants*

Participants were 50 healthy full-term 4-month-olds, 23 male and 26 female (range = 3 months 21 days to 5 months 18 days, \( M = 4 \) months 23 days); 18 infants were randomly assigned to the experimental and inanimate-control conditions and 14 to the cover-control condition. Another 17 infants were excluded because they were inattentive (3), distracted (1), or looked the maximum time allowed in the test trials (13).

*Apparatus and stimuli*

The apparatus and stimuli were identical to those used in Experiment 1 with the exception of the puppets, which were two identical Elmo puppets (about 28 cm \( \times \) 12 cm \( \times \) 24.5 cm at their largest points) made of red furry fabric; each Elmo has a large head with large eyes.
Procedure

The procedure was identical to that used in Experiment 1. Infants were highly attentive during the initial phases of the recipient-familiarization, experimenter-familiarization and test trials. The final phase of each trial ended when infants (a) looked away for 2 (familiarization trials) or 0.5 (test trials) consecutive seconds after having looked for at least 5 (familiarizations) or 8 (test) cumulative seconds or (b) looked for a maximum of 60 cumulative seconds (familiarization 1) or 35 cumulative seconds (familiarization 2 and test). Infants in all three conditions looked about equally during the final phase of the recipient-familiarization trial, $F(2, 47) = 2.30, p = .111$; and infants in the experimental and inanimate-control conditions looked about equally during the final phase of the experimenter-familiarization trial, $F(1, 34) = 3.41, p = .073$ (infants in the cover-control condition saw different actions in the cover-familiarization trial and therefore their looking times could not be compared to those of infants in the experimental and inanimate-control conditions). Finally, preliminary analyses of the final phase of the test trial reveal no significant interaction of condition and event with infant's sex, which Elmo received the first cookie, or which cover was lifted first (cover-control condition only); the data were therefore collapsed across these latter three factors.

Results

Infants' looking times during the final phase of the test trial (Fig. 6) were subjected to an ANOVA with condition (experimental, inanimate-control, or cover-control) and event (unequal or equal) as between subject factors. The analysis yielded only a significant
Condition x Event interaction, $F(2, 44) = 3.17, p = .052$. Planned comparisons revealed that infants in the experimental condition who saw the unequal event ($M = 20.2, SD = 6.2$) looked reliably longer than infants who saw the equal event ($M = 11.9, SD = 3.4$), $F(1, 44) = 6.95, p = .012$; infants in the inanimate-control condition looked about equally whether they saw the unequal ($M = 14.1, SD = 8.3$) or equal ($M = 14.9, SD = 8.1$) event, $F(1, 44) = 0.07, p = .793$, and infants in the cover-control condition also looked about equally regardless of if they saw the unequal ($M = 15.9, SD = 4.5$) or equal ($M = 18.2, SD = 7.4$) event, $F(1, 44) = 2.85, p = .098$.

**Discussion**

Consistent with the results from Experiment 1, infants in the experimental condition expected the experimenter to divide the two cookies equally between the two Elmos and were surprised when they did not. However this expectation did not hold when the Elmos were inanimate objects (inanimate-control condition) or when the experimenter simply removed covers to reveal the cookies (cover-control condition). Together, the results from these three conditions provide strong evidence that even infants as young as 4 months already expect a distributor to divide resources equally between two similar individuals.

**Conclusion**

The present results with 9- and 4-month-olds are important for two main reasons. First, they contribute to the methodological assessment of sensitivity to fairness in the first year of life. Specifically, our results indicate that young infants are more likely to reveal an expectation of fairness when tested with one- as opposed to two-distributor tasks (Geraci
and with two- as opposed to four-item distributions (Sommerville et al., 2013). A two-item distribution may be less challenging either because it requires keeping track of fewer items or because it allows a some-versus-none distinction: in the unequal allocation, one individual gets some resources whereas the other individual gets none, and this simple 2:0 contrast may be easier to detect as a fairness violation than a 3:1 contrast, where each individual gets at least some resources. Future research can evaluate these two possibilities by testing young infants with 2:2 and 4:0 allocations.

Second, the present results bear on theoretical accounts of the developmental origins of fairness. Researchers from various disciplines within the cognitive sciences have speculated that a concern for fairness is part of humans’ evolved adaptation for intuitive moral reasoning (e.g., Haidt & Joseph, 2007; Jackendoff, 2007; Premack, 2007; Sigmund et al., 2002), and the positive evidence reported here that infants as young as 4 months of age already expect a distributor to act fairly is consistent with these speculations. This evidence also gives weight to the possibility that, in some situations at least, young infants’ responses to fair and unfair distributors rest on moral, as opposed to merely affiliative, evaluations (Geraci & Surian, 2011; Meristo & Surian, 2013). If young infants possess a sense of fairness, then they may regard an unfair distributor not only as a less desirable affiliate but also as a moral violator who should incur punishment.

In sum, these results indicate that infants in the first year of life already expect fair allocations, providing new evidence that expectations about how individuals should act toward others emerge early in human life (Baillargeon et al., 2015). These results are consistent with a principle-based approach and suggest that as humans we come to the world already equipped with the flexible cognitive architecture necessary to understand
the social world around us.
CHAPTER 3

EXPECTATIONS OF FAIRNESS AND INGROUP LOYALTY IN 19-MONTH-OLDS

The abundance of intergroup conflict that has plagued our world historically and in modern times has motivated decades of research in developmental and social psychology in an attempt to better understand the origins and development of ingroup and intergroup biases. Within this broad area of research, two broad questions have been: 1) what are the necessary and sufficient conditions to elicit ingroup favoritism in children and, 2) when and how do children begin to show such favoritism.

Studies on ingroup/outgroup expectations have typically utilized two kinds of groups; real groups that exist in the world like race and gender (e.g., Banaji et al., 2007; Bar-Haim et al., 2006) or novel, arbitrary groups (i.e., minimal groups) that are created only for the purpose of a particular study (e.g., Bigler, Jones & Lobliner, 1997; Dunham, Baron & Carey, 2011; Tajfel, 1982). Race and gender have likely been the most studied real groups; however, there are many studies that have used ethnicity and religion (e.g., Birnbaum, Deeb, Segall, Ben-Eliyahu & Diesendruck, 2010), kin (e.g., Olson & Spelke, 2008) friends (e.g., Moore, 2009; Olson & Spelke, 2008; Vaughan, Tajfel & Williams, 1981) as well as language and accent (e.g., Kinzler et al., 2009), as markers of group membership. Minimal groups, in contrast, do not exist outside of a particular study and therefore must be created intentionally. One way researchers often create minimal groups is by randomly assigning participants one of two colored shirts (e.g., to create a red team and a blue team). Researchers who want to create completely random groups might have an experimenter conceal a small object in each of her hands, corresponding to the color of each shirt, and then ask participants to choose a hand in order to reveal an object that matches one of the
tee shirt colors (e.g., Dunham, Baron & Carey, 2011). Minimal groups can also be formed by assigning tee shirt color according to non-informative biological features such as hair color (e.g., Bigler, Jones & Lobliner, 1997). Additional variables including the perceptual salience of the groups and whether or not the groups are competitively primed also vary across studies.

In order to measure ingroup biases in children, researchers have used a variety of methods, including: assessing their explicit preferences for ingroup versus outgroup members (e.g., Kinzler et al., 2009; Patterson & Bigler, 2006), looking at how children distribute resources to ingroup versus outgroup members (e.g., Dunham, Baron & Carey, 2011; Lerner, 1974; Moore, 2009; Olson & Spelke, 2008; Spielman, 2000; Vaughan, Tajfel & Williams, 1981), assessing which types of behaviors they attribute to ingroup versus outgroup members (e.g., “who gave their friend a new toy” versus “who took some cookies without asking”) (e.g., Dunham, Baron & Carey, 2011), as well as assessing their implicit attitudes towards ingroup and outgroup members (e.g., Banaji et al., 2007; Dunham, Baron & Carey, 2011). The duration of time children spend exposed to an intergroup situation also varies, lasting anywhere from one test session (e.g., Banaji et al., 2007) to as long as 4 weeks (e.g., Bigler, Jones & Lobliner, 1997).

The most consistent finding from these and similar studies is that children from ages 3 to 10 show favoritism toward ingroup members regardless of whether or not the group is a real group or a minimal group; this finding holds across the different studies and methods described above. Of particular relevance to my purpose here, many of these studies have looked specifically at how group membership affects children’s expectations about the distribution of resources. For example, when resources are scarce, children as
young as 3.5 years will give more to friends and family than to strangers (Olson & Spelke, 2008). When sharing resources has a cost to the child (i.e., choosing between a “one for me, one for you” or “two for me, none for you” allocation) 4.5-year-olds will choose the (1,1) allocation when the recipient is a friend but will choose the (2,0) allocation when the recipient is a stranger or non-friend (Moore, 2009). When 4-to 10-year-olds who complete an assigned task with varying levels of success are given rewards and must determine how to best divide them, they are more likely to divide the rewards equally the longer they remain in close proximity (Gerson & Damon, 1978). And three-year-olds who have to work together in order to access a reward will share the reward equally (Warneken et al., 2010).

With the exception of Olson and Spelke (2008), these studies have largely utilized first-party situations where the children themselves are potential recipients. However, given that infants in the first two years of life are already sensitive to issues of fairness in third-party situations (Chapter 2), here I ask whether infants in the second year of life display expectations of fairness in terms of the distribution of resources in third-party situations involving different groups. In Experiment 3, I explore the possibility that 19-month-olds think fairness only applies to the ingroup and may have no expectation when a member of one group divides resources between two individuals who belong to a different group. In Experiment 4 and 5, I ask whether expectations of fairness can be modified by group membership; will 19-month-olds expect a member of one group to favor his ingroup member when distributing a limited number of resources between an ingroup member and an outgroup individual (i.e., when there are only two objects and two ingroup members) (Experiment 4)? What if there are adequate resources for all participants (i.e., three objects and two ingroup members and one outgroup individual) (Experiment 5)? Finally, in
Experiment 6 I ask if 19-month olds view an equal distribution as acceptable (regardless of group membership) whenever there are sufficient resources for all participants? Or do they view an equal distribution as unacceptable even when resources are ample, if the resources are needed to complete a task?

3.1 EXPERIMENT 3

In Experiment 3, I ask whether 19-month-olds expect fairness to apply when a member of one group distributes objects to two members of a different group. I tested infants using different animal puppets to represent ingroup and outgroup individuals in a third-party distribution task: a monkey or giraffe puppet divided two cookies equally or unequally between two giraffe or two monkey puppets (Fig. 7). In each of two test trials, the infants saw either an unequal distribution (unequal event) or an equal distribution (equal event) (each infant saw only one kind of event across both trials). Each trial had an initial and a final phase. During the initial (31-s) phase, two giraffe (or monkey) puppets protruded from openings in the back wall of the apparatus and “danced” back and forth several times (half of the infants saw giraffe recipients and half saw monkey recipients but we use the giraffe recipients for ease of description). A monkey (or giraffe) then entered the stage through a fringe-covered window in the right wall of the apparatus and the giraffes turned toward the monkey, as though to observe his actions (half of the infants saw a monkey distributor and half saw a giraffe distributor, but we again use the monkey distributor for ease of description). The monkey brought in a tray with two identical objects (toy ducks or edible cookies) and announced, “I have toys/cookies!”; the giraffes responded by saying, “Yay, yay!” in two distinct voices, while dancing back and forth. Next
the monkey placed one object in front of one giraffe and then he placed the second object in front of the same giraffe (unequal event) or in front of the other giraffe (equal event). Finally, the monkey left, and the recipient giraffes looked down at their placemats and paused. During the final phase of the trial, infants watched this paused scene until the trial ended.

If 19-month-olds think fairness only applies to the ingroup, then infants who see a monkey puppet divide two objects between two giraffe puppets might look equally whether the monkey divides the objects equally or unequally (i.e., for a monkey, fairness does not apply to giraffes). However, if fairness does apply when both potential recipients belong to a different group, then infants should look reliably longer at the unequal than at the equal event.

**Method**

**Participants**

Participants were 18 healthy full-term 19-month-olds, 8 male and 10 female (range = 18 months 23 days to 19 months 28 days, \( M = 19 \) months 8 days). Half of the infants were randomly assigned to each event. Another 2 infants were excluded because they were distracted (1) or overly active (1).

**Apparatus and stimuli**

The apparatus was identical to that used in previous experiments. The distributor-puppet was either a monkey puppet (about 26 cm x 18 cm x 13 cm at its largest point) made of brown fabric or a giraffe puppet (about 26 cm x 15 cm x 11 cm at its largest point)
made of beige and brown fabric. The distributor-puppet entered the stage through a fringed curtain in the right wall of the apparatus.

The recipients were two monkey puppets or two giraffe puppets (and both animals were identical to the distributor puppets described above). The recipient-puppets protruded from openings (each 20 cm x 12.5 cm and filled with beige felt) located 20 cm apart in the back wall of the apparatus. Centered beneath each recipient-puppet was a white placemat (1 cm x 20 cm x 13 cm).

The two pairs of identical items used in the trials were purple toy ducks or edible brown cookies. The distributor-puppet introduced the items on a round blue tray (1.5 cm high, 17 cm in diameter).

**Procedure**

Infants sat on a parent’s lap centered in front of the apparatus; parents were instructed to remain silent and to close their eyes during the test trials. Each infant’s looking behavior was monitored by two hidden naïve observers; looking times during the initial and final phases of each trial were computed separately, using the primary observer’s responses. Interobserver agreement (calculated for each trial by determining the proportion of 100-ms intervals in which the observers agreed) averaged 94% per trial per infant.

Infants were highly attentive during the initial phases of the test trials. The final phase of each trial ended when the infant (a) looked away for 2 consecutive seconds after having looked for at least 5 cumulative seconds or (b) looked for a maximum of 60 cumulative seconds. Preliminary analyses of the final phases of the test trials revealed no
significant interaction of event with infant’s sex, identity of distributor-puppet (monkey or giraffe), or which recipient received an object first; the data were therefore collapsed across these latter three factors.

**Results and Discussion**

Infants’ looking times during the final phases of the two test trials (Fig. 9) were averaged and subjected to an ANOVA with event (unequal or equal) as a between-subjects factor. The analysis yielded only a significant main effect of event, $F(1, 16) = 7.41, p = .015$, indicating that infants who saw the unequal event ($M = 28.5, SD = 14.8$) looked reliably longer than infants who saw the equal event ($M = 14.0, SD = 6.1$).

These results suggest that infants do have a sensitivity to fairness in situations that involve both ingroup and outgroup individuals. Infants who saw the unequal event looked reliably longer than infants who saw the equal event, which indicates that infants apply fairness to outgroup individuals as well as ingroup members. The next important question to ask is: Will infants display different expectations when one of the potential recipients belongs to the same group as the distributor and the other potential recipient belongs to a different group? I address this question in Experiment 4.

3.2 EXPERIMENT 4

Given that the results of Experiment 3 suggest that infants do apply fairness to both ingroup and outgroup individuals, here I explore if and how these expectations can be modified by group membership in the second year of life. To address this question, I again tested 19-month-old infants using different animal puppets to represent ingroup and
outgroup individuals in a third-party distribution task: a monkey or giraffe puppet divided two cookies either equally between another monkey and giraffe puppet (equal event) or the distributor puppet gave both cookies to his ingroup member (favors-ingroup event) or both to the outgroup individual (favors-outgroup event). If infants possess both an ingroup loyalty and a fairness principle, they may view these events in several possible ways: 1) if the fairness principle overrides the ingroup loyalty principle then infants should find both unequal distributions unexpected; 2) if the ingroup loyalty principle overrides the fairness principle, then infants should expect the distributor to favor his ingroup member and view the other two events as unexpected; and 3) if ingroup loyalty and fairness are ranked about equally, then infants may view as unexpected only the event where the distributor favors the outgroup individual (this event violates both principles, whereas the other two events agree with one of the principles: the favors-ingroup event with the ingroup loyalty principle, and the equal event with the fairness principle). It is also likely that learning plays a significant role here; even if infants come to the world with principles of ingroup loyalty and fairness, they still have to learn how their culture orders the principles in different situations.

**Design**

In Experiment 4, 19-month-olds watched live events in which a puppet (monkey or giraffe) divided resources between two animated puppets, one monkey and one giraffe (Fig. 8). In each of two test trials, the infants saw either an unequal distribution favoring the ingroup member (favors-ingroup event), an unequal distribution favoring the outgroup member (favors-outgroup event) or an equal distribution (equal event) (each infant saw
only one kind of event in both trials). Each trial had an initial and a final phase. During the initial (31-s) phase, one giraffe protruded from an opening in the back wall of the apparatus; the giraffe “danced” back and forth several times until a monkey puppet entered from a second opening in the back wall (next to the giraffe) and clapped several times; in front of each puppet was a small placemat. A second monkey (or giraffe; the distributing puppet was counterbalanced across infants but we use the monkey distributor for ease of description) then entered the stage through a fringe-covered window in the right wall of the apparatus and the puppets turned toward the monkey, as though to observe his actions. The monkey brought in a tray with two identical objects (toy ducks or edible cookies) and announced, “I have toys/cookies!”; the giraffe responded first by saying “Yay, yay!” while dancing back and forth; the monkey responded next by saying “Yay, yay!” in a different voice, while clapping his hands. Next the distributing monkey placed the objects one at a time on the placemat in front of the monkey (favors-ingroup event), in front of the giraffe (favors-outgroup event) or in front of both the monkey and giraffe (equal event; the distributing puppet always gave to his ingroup member first). Finally, the monkey distributor left, and the giraffe and monkey recipients looked down at their placemats and paused. During the final phase of the trial, infants watched this paused scene until the trial ended.

As stated above, if infants are sensitive to both ingroup loyalty and fairness by 19 months, then their expectations in each event will depend on how they apply each principle: it is possible that they will expect only ingroup favoritism, only fairness, or they may show expectations of both if both principles carry about the same weight.
Method

Participants

Participants were 27 healthy full-term 19-month-olds, 14 male and 13 female (range = 18 months 22 days to 19 months 29 days, $M = 19$ months 10 days). Infants were randomly divided between the three events (equal, favors-ingroup and favors-outgroup). Another 4 infants were excluded because they were overly active or distracted (2) fussy (1) or because of parental interference during testing (1).

Apparatus and stimuli

The apparatus and stimuli were identical to that used in Experiment 3. Each test session was recorded, monitored and checked off-line as in previous experiments.

Procedure

The procedure was identical to that used in previous experiments. Interobserver agreement averaged 95% per trial per infant.

Infants were highly attentive during the initial phases of the test trials. The final phase of each trial ended when the infant (a) looked away for 2 consecutive seconds after having looked for at least 5 cumulative seconds or (b) looked for a maximum of 60 cumulative seconds. Preliminary analyses of the final phases of the test trials revealed no significant interaction of condition with infant’s sex, identity of distributor puppet (monkey or giraffe), or which recipient puppet (monkey or giraffe) was on each side; the data were therefore collapsed across these latter three factors.
Results

Infants’ looking times during the final phases of the two test trials (Fig. 9) were averaged and subjected to an ANOVA with event (favors-ingroup, favors-outgroup, or equal) as a between-subjects factor. The analysis yielded only a significant main effect of event, $F(2, 24) = 4.82, p=.017$. A planned contrast revealed that infants who saw the favors-outgroup event ($M = 29.3, SD = 11.3$) and infants who saw the equal event ($M = 28.3, SD = 10.4$) looked reliably longer than infants who saw the favors-ingroup event ($M = 16.0, SD = 8.4$) $F(1, 24) = 14.41, p <.001$ (the former two groups did not differ, $F(1, 24)=0.04, p = .843$).

Discussion

Infants viewed the favors-ingroup event as expected and the favors-outgroup event as unexpected, suggesting that they did have some sensitivity to the ingroup loyalty principle. However, they also viewed the equal event as unexpected, which suggests that in this situation, they were ranking the ingroup loyalty principle above the fairness principle. One possible explanation is that when resources are limited (i.e., there are only two toys/cookies for two monkeys), they must be saved for the ingroup. If this explanation is correct, then when there are enough resources for everyone (e.g. three toys/cookies; enough for each ingroup member as well as the outgroup individual), infants should no longer be surprised when the distributor gives objects to both an ingroup member and an outgroup individual. I explore this idea in Experiment 5.

3.3 EXPERIMENT 5
Based on the findings from Experiment 4, it seemed that at 19 months, infants rank ingroup loyalty over fairness. If they see a monkey dividing objects between a monkey and a giraffe, they expect the monkey to only give objects to the other monkey. In Experiment 4 there were only two objects and two monkeys (the monkey distributor and the monkey recipient) and one giraffe; therefore, infants might have reasoned that there were only enough objects for the monkeys (one each). However, what if the monkey distributor brought in three objects, instead of two, on his tray? Would 19-month-olds now find it acceptable for the monkey distributor to give one of the objects to the giraffe recipient? To explore this question, I tested infants using the same procedure as in Experiment 4 except the distributor puppet entered the stage with three identical toys. The distributor gave one toy to each recipient (equal event), gave two toys to the outgroup individual (favors-outgroup event), or gave two toys to his ingroup member (favors-ingroup event); in all cases, the distributor kept the third toy for himself and left the stage with it. I reasoned that if 19-month-olds always expect distributors to rank ingroup loyalty above fairness in distributing windfall resources, then results should be the same as in Experiment 4: infants should look reliably longer if shown the favors-outgroup or equal event as opposed to the favors-ingroup event. However, if 19-month-olds’ expectations are sensitive to the abundance or scarcity of resources, then given that there were now enough objects for all three puppets, infants in Experiment 5 might now find an equal distribution acceptable.

**Design**

In Experiment 5, 19-month-old infants watched events identical to those in Experiment 4, except that the distributor brought in three objects instead of only two. In
the equal event, the distributor puppet gave one toy to each of the recipient puppets (one monkey and one giraffe) and then took the third toy with him when he left. In the other events, the distributor gave two toys to the ingroup recipient (favors-ingroup event) or to the outgroup recipient (favors-outgroup event), and again took the remaining toy with him when he left the stage. There are three possible outcomes: infants might still expect the distributor to favor his ingroup; they might expect the distributor to be fair; or they might now view both ingroup loyalty and fairness as acceptable. If the latter outcome is what we find, it would suggest that 1) Ingroup loyalty trumps fairness when resources are limited but 2) when resources are not limited both principles apply equally; infants view both courses of action as acceptable and must learn from their culture how to prioritize in this context.

**Method**

**Participants**

Participants were 24 healthy full-term 19-month-olds, 14 male and 10 female (range = 18 months 26 days to 20 months 4 days, \( M = 19 \) months 18 days). The infants were randomly assigned to each event (equal, favors-ingroup, favors-outgroup). Another 5 infants were excluded because they were not able to finish the experiment (3) or because they looked the maximum time allowed in the test trials (2).

**Apparatus, stimuli and procedure**

The apparatus, stimuli and procedure were identical to that used in Experiment 4, with the exception of a third identical toy or cookie.
Results

Infants’ looking times during the final phases of both test trials (Fig. 9) were averaged across trials and subjected to an ANOVA with event (equal, favors-ingroup or favors-outgroup) as a between subject factor. The analysis yielded only a marginally significant main effect of event, $F(2, 21) = 3.29, p = .057$. A planned contrast revealed that infants who saw the favors-outgroup event ($M = 34.7, SD = 12.7$) looked reliably longer than infants who saw the equal event ($M = 24.8, SD = 12.1$) and infants who saw the favors-ingroup event ($M = 20.7, SD = 9.7$), $F(1, 21) = 24.03, p < .0001$ (the latter two groups did not differ $F(1, 21) = 0.53, p = .475$).

Discussion

These data suggest that when there are sufficient resources for all three individuals involved in a distribution event (one distributor and two recipients), 19-month-olds no longer view the equal event as unexpected. In other words, infants find it acceptable for a distributor to give an object to an outgroup individual as long as there are sufficient objects for all ingroup members. However, infants also view the favors-ingroup event as expected, which suggests that even when there are enough resources to go around, infants don’t view the distributor as obligated to give one to the outgroup individual.

It seems likely then that infants must learn from their culture how to prioritize which principle to use in this type of situation; at 19 months they still rank ingroup loyalty and fairness equally. However, research by Olson and Spelke (2008), discussed in the introduction, suggests that by 3.5 years of age, children prioritize fairness; as long as there
were as many items as dolls, children helped a protagonist allocate items equally to all potential recipients regardless of how they were identified (i.e., as the protagonist’s siblings and friends or as strangers).

3.4 EXPERIMENT 6

As adults, several factors affect whether we share resources with outgroup individuals. One such factor, as with children and infants, is whether there are sufficient resources for our ingroup; another factor is whether the resources are potentially valuable resources that might be needed at a future time. Do infants also take this latter factor into account when reasoning about resource allocations? Experiment 6 began to address this question: I asked whether 19-month-olds would view an equal distribution as unacceptable even when there were sufficient resources for all individuals present, if infants realized that these resources might be needed to complete a task?

In addition, to extend the results of Experiments 4 and 5 to a new situation, I made two main changes. First, instead of watching interactions between different animal puppets, infants watched interactions between human assistants belonging to different minimal groups marked by distinctive outfits. The two individuals on either side of the apparatus were dressed in different outfits, and the experimenter at the back was dressed in one of these outfits (counterbalanced). Second, instead of distributing windfall resources, the experimenter provided instrumental help to one or both individuals. Each was doing a (different) task with a marker until it dried out. The experimenter then brought out a cupful of new markers, and she gave one to each individual (equal event),
one only to her ingroup member (favors-ingroup event), or one only to the outgroup individual (favors-outgroup event).

At least two outcomes were possible. One possibility was that, as in Experiment 5, infants would look reliably longer at the favors-outgroup event than at the other two events, this would suggest that with ample resources 19-month-olds see fairness as acceptable; infants would expect the experimenter to help both the ingroup and outgroup individuals, since she had ample markers. However, another possibility was that infants would look reliably longer at the favors-outgroup and equal events than at the favors-ingroup event (as in Experiment 4); infants would expect the experimenter to give a marker only to the ingroup individual because although there are plenty of markers, these are clearly needed to accomplish the task at hand. If this second possibility were correct, then it would suggest that at 19 months infants apply the ingroup loyalty principle as opposed to the fairness principle whenever resources are scarce or may be needed for completing a task.

**Design**

In the *experimental* condition (Fig. 10) of Experiment 6, 19-month-olds watched live events in which two individuals who belonged to different groups (marked by hippy and princess costumes), vainly attempted to color with dried-out markers. In the *equal* event, an experimenter (who belonged one of the two groups), witnessed the individuals’ failed efforts and offered a new marker to each individual. In the *favors-ingroup* event, the experimenter gave a new marker only to the individual in her group. Finally, in the *favors-
outgroup event, the experimenter gave a new marker only to the individual belonging to the other group.

Each infant received two group-familiarization trials, one orientation trial and one test trial (each infant saw only one test event). Each group-familiarization trial served to introduce infants to the two groups, one at a time. During the initial (30-s) phase of the first group-familiarization trial, the experimenter and the individual who belonged to her same group (which costume and which individual were counterbalanced across infants) each read their own copy of the same book, and turned the pages in unison. During the final phase of the trial, the two group members continued to turn pages of their books until they reached the end (at which point they each closed their book and paused) or until the infants looked away, thus ending the trial. During the initial (30-s) phase of the second group-familiarization trial, only the individual who belonged to the other group was present in the apparatus. She worked to put a puzzle together; she picked up one piece at a time and placed it in the correct location. During the final phase of the trial, she continued to put the remaining pieces together until she completed the puzzle (at which point she looked down and paused) or until the infants looked away and the trial ended.

In the orientation trial, infants saw the two groups together for the first time; the member(s) of one group colored pictures, whereas the member(s) of the other group drew letters on a lined piece of paper. The purpose of the orientation trial was to further establish each group as well as to introduce infants to the activities that would take place during the test trial. At the start of the initial (35-s) phase, the experimenter and her ingroup member each colored a line drawing of a cupcake on a green piece of paper, with red Crayola markers. The other (outgroup) individual entered the stage with her own red
marker and a piece of white lined paper, and she began to write the ABC’s while the members of the other group continued to color. Next, a bell rang, and the experimenter at the back window, said, “Oh! I have to go!”, put her cap on her marker, and left the stage. The two individuals continued to color or write letters until the trial ended. There was no final phase because the trial automatically ended after 35 seconds regardless of infants’ looking behavior. Our reasoning here was that we wanted to limit the amount of time infants saw the ingroup and outgroup members using their markers together to avoid the possibility that infants might view this behavior as coordinated and thus as a stronger marker of group membership than the costumes.

The initial (44-s) phase of the test trial began in the same way the orientation trial ended; the two individuals (one belonging to each group) attempted to color or write letters on their respective papers, however both individuals were unsuccessful because their markers had run out of ink. After each individual tried to mark on her page, she looked at her marker with mild frustration and then attempted to color again. The experimenter at the back then entered with her own marker and picture to color, and she began to color while both individuals attempted to use their dried-out markers one more time. Each individual then exclaimed in turn, “My marker is broken!”, “My marker is broken too!” (which individual spoke first was counterbalanced across infants). The experimenter responded, “I have some more markers!”. She then bent down, retrieved a cup filled with 7 identical red markers, and set it in the middle of the stage in front of her. In the equal event, the experimenter picked up two markers (one in each hand), said, “Here! You can have one of my new markers”, and handed a marker to both individuals at the same time. The experimenter then placed the cup of markers back onto the room floor and everyone went
back to drawing with their markers. Next a bell rang and both individuals said, “Oh, I have
to go” and left the stage, leaving their markers and papers behind. During the final phase of
the test trial, the experimenter continued to color until the trial ended.

In the favors-ingroup event, the actions were identical, except that the experimenter
gave a marker only to the individual who belonged to her same group and therefore only
the experimenter and her ingroup member continued to color; the individual who belonged
to the other group simply looked down at her paper and paused until the bell rang to call
her away. In the favors-outgroup event, the actions were again identical to the favors-
ingroup event except that the experimenter gave a marker only to the individual who did
not belong to her group.

Method

Participants

Participants were 24 healthy full-term 19-month-old infants, 12 male and 12 female
(range = 18 months 20 days to 20 months 7 days, M =19 months 16 days) from English
speaking families; 8 infants were randomly assigned to each event (equal, favors-ingroup
or favors-outgroup). Another 13 infants were excluded for looking the maximum time
allowed (9), for not being able to complete the experiment or for looking more than 2 times
shorter than the condition mean (1).

Apparatus and stimuli

The apparatus was identical to that used in previous experiments. The two
individuals knelt at windows (51 cm x 38 cm) in the right and left walls of the apparatus;
the experimenter knelt at a window (71.5 cm x 56 cm) in the back wall of the apparatus. The individuals entered and exited the apparatus by opening and closing a sliding white curtain; the experimenter entered and exited using two attached doors.

The hippy costume consisted of a dark green turtleneck, purple patterned headband (106 cm x 9.5 cm), and pink foam eyeglasses (13.5 cm x 12.5 cm x 6.5 cm); the princess costume consisted of a pink patterned turtleneck, a yellow foam crown (22 cm x 10 cm x 15.3 cm), and a felt pink flower necklace (30.5 cm x 1.5 cm x 23.5 cm).

Across trials, the individuals and experimenter played with several items, including a peter rabbit board book (10 cm x 10 cm x 1.2 cm), a Disney princess puzzle (20.2 cm x 14.3 cm x 0.5 cm), a green sheet of paper (21.5 cm x 14.2 cm) with a printed cupcake drawing, a white sheet of paper (21.5 cm x 14.2 cm) with black ruled lines, and red Crayola markers (13.8 cm x 1.4 cm x 1 cm). A plastic cup (8 cm x 8 cm x 8.5 cm) was also used as a container for the markers.

Each test session was recorded, monitored and checked off-line as in all previous experiments.

**Procedure**

The procedure was identical to that used in previous experiments. The final phase of each trial ended when the infant (a) looked away for 2 consecutive seconds after having looked for at least 5 cumulative seconds or (b) looked for a maximum of 70 cumulative seconds. Interobserver agreement averaged 96% per trial per infant. Preliminary analyses revealed no significant interaction of event with infant’s sex, costume of ingroup (hippy or
princess) or who spoke first in the test trial (experimenter on right or left); therefore the data were collapsed across these three latter three factors.

**Results**

Infants’ looking times during the final phase of the test trial (Fig. 11) were subjected to an ANOVA with event (equal, favors-ingroup or favors-outgroup) as a between-subjects factor. The analysis yielded only a significant main effect of event, $F(2, 21) = 7.63, p = .003$. A planned contrast revealed that infants who saw the favors-outgroup event ($M= 41.1, SD = 11.1$) and infants who saw the equal event ($M = 39.8, SD = 16.2$) looked reliably longer than infants who saw the favors-ingroup event ($M = 20.4, SD = 6.1$), $F(1,21) = 15.29, p < .001$ (the former two groups did not differ, $F(1, 21) = 0.04, p = .843$).

**Discussion and Future Directions**

These results replicate the results of Experiment 4 in a task that uses: instrumental helping instead of windfall resource distribution, human experimenters and groups based on costumes instead of puppets of different animal kinds, and abundant but potentially needed resources instead of scarce resources. This suggests that by 19 months, infants have a sensitivity to both fairness and ingroup loyalty that they can apply flexibly in different situations.

However, there are at least two alternative interpretations. One possible interpretation is that with many markers in the cup, infants are not able to determine the exact number of markers and therefore use a strategy of keeping all resources for the ingroup. To address this concern, I am currently testing infants in a 3-marker condition,
which is identical to the experimental condition except that the experimenter only has 3 markers in her cup (instead of 7). With only 3 markers, infants should have no difficulty determining how many markers are in the cup. Therefore, if infants who see the equal and favors-outgroup events look reliably longer than infants who see the favors-ingroup event (as in Experiment 6), it provides more evidence that when resources are needed to complete a task, 19-month-olds expect them to be kept for the ingroup.

Another alternative interpretation is that infants think when humans are involved resources should always be kept for the ingroup regardless of how many there are. To address this idea, I will use the same method as in Experiment 5 but with three humans and three markers; there will again be two individuals who belong to different groups and one experimenter who belongs to the same group as one of the individuals and the experimenter will divide the markers between the two individuals. If infants find the equal and favors-ingroup distributions acceptable, as they did in Experiment 5, then it suggests that the findings in Experiment 6 are really about whether resources are needed for the task at hand.

**Conclusion**

The results from Experiments 3-6 are important for two main reasons. First, they contribute to the methodological assessment of sensitivity to ingroup loyalty in the second year of life. Specifically, our results indicate that when tested with a third-party task as opposed to a first-party task (e.g., Olson & Spelke, 2008; Moore, 2009; Warneken et al., 2010) infants display expectations about ingroup loyalty as early as the second year of life. It is likely that in a third-party task, infants' tendencies to act selfishly do not interfere with
their expectations about ingroup loyalty and thus the results from third-party tasks provide a clearer picture of younger infants' expectations about how others *should* act in a given situation.

Second, the present results bear on theoretical accounts of the mechanism of ingroup biased behavior. Researchers have speculated that ingroup biased behavior is a moral principle that has evolved as a biological adaptation (Brewer, 1999; Haidt, 2007; Tajfel, 1982), and the evidence reported here that infants in the second year of life already display very flexible notions of ingroup loyalty (and fairness) that they can apply appropriately in very different contexts, supports this view.

In combination, consistent results in Experiment 4 and Experiment 6 suggests that by the second year of life, infants are able to apply notions of ingroup loyalty and fairness in very different contexts and that by 19 months infants seem to privilege favoring the ingroup over fairness (at least when resources are scarce or needed by the ingroup). These results are again consistent with a principle-based approach and provide converging evidence that we come to the world equipped with the complex and flexible cognitive architecture we need in order to make sense of the social world around us.
CHAPTER 4
CONCLUSION

In this dissertation, I have addressed two major questions related to the development of infants’ concern for fairness: 1) at what age do infants first show a concern for fairness in terms of how resources should be distributed? And 2) how does group membership affect these expectations?

Recent research looking at infants’ sensitivity to fairness in the first year of life (e.g., Geraci & Surian, 2011; Meristo & Surian, 2013; Sommerville et al., 2013) has yielded results compatible with two diverging hypotheses regarding early responses to fairness: the late-emergence hypothesis and the early-emergence hypothesis. In Experiments 1 and 2, I attempted to figure out which hypothesis was correct by testing infants in the first year of life with a simple two-item one-distributor task: an experimenter divided cookies either equally or unequally between two animated puppets (penguins in Experiment 1 and Elmos in Experiment 2). The results of both experiments were positive: both 9- and 4-month-old infants expected the experimenter to divide the cookies equally, which suggests that infants in the first year of life do show a sensitivity to fairness.

These positive results are important for several reasons. First, they provide evidence in support of the early-emergence hypothesis. Second, they provide the first demonstration that infants in the first year of life already expect a distributor to divide objects fairly. Third, they constrain theoretical accounts of the developmental origins of fairness. The finding that infants as young as 4 months already expect a distributor to act fairly is consistent with speculations that a concern for fairness is part of humans’ evolved
adaptation for intuitive moral reasoning (e.g., Haidt & Joseph, 2007; Jackendoff, 2007; Premack, 2007; Sigmund et al., 2002). This evidence also supports the possibility that young infants’ responses to fair and unfair distributors stem from moral, as opposed to affiliative, evaluations (Geraci & Surian, 2011; Meristo & Surian, 2013). If young infants possess a sense of fairness, then they may see an unfair distributor not only as a less desirable affiliate but also as a moral violator who deserves to be punished. Finally, our positive results inform the methodological assessment of sensitivity to fairness in the first year of life. Specifically, they suggest that young infants are more likely to display a sensitivity to fairness when tested with one-distributor tasks and two-item distributions (as opposed to two-distributor tasks or four-item distributions; Geraci & Surian, 2011; Sommerville et al., 2013). It is likely that a one-distributor task is less challenging because infants see the same individual performing the fair and unfair action. It is also likely that a two-item distribution is less challenging because it requires infants to keep track of fewer items or because it allows a some-versus-none distinction.

In combination, these results indicate that infants as young as 4 months of age already expect fair allocations, providing new evidence that expectations about how individuals should act toward others emerge early in human life (Baillargeon et al., 2015).

In Experiments 3-6, I focused on infants in the second year of life and examined whether and how their expectations about fairness are modified by considerations of group membership. The most consistent finding from past studies is that children from ages 3 to 10 favor ingroup members when distributing resources or choosing allocations (Gerson & Damon, 1978; Moore, 2009; Olson & Spelke, 2008; Warneken et al., 2010). However, with the exception of Olson and Spelke (2008), the children in these studies were directly
involved in the distribution as potential recipients making it more likely that self interest was a driving force in their distributive behavior. Using third-party situations, where infants are simply outside observers, allows us to identify what infants think *should* happen versus what they themselves would do.

In Experiment 3, I asked whether 19-month-olds would expect fairness in a distribution event in which an individual from one group divided resources between two potential recipients from a different group. I used different animal puppets to represent the ingroup and outgroup individuals: a monkey (or giraffe) puppet divided two cookies equally or unequally between two giraffe or (monkey) puppets. Infants who saw the unequal event looked reliably longer than infants who saw the equal event, suggesting that by 19 months infants possess an abstract expectation of fairness that applies broadly across groups: all other things being equal, if A1 divides resources between B1 and B2, then A1 should do so fairly.

In Experiment 4, I asked if infants would still display an expectation of fairness when one of the potential recipients belonged to the same group as the distributor and the other potential recipient belonged to a different group. Here 19-month-olds saw a monkey (or giraffe) puppet divide two cookies between another monkey and giraffe: the distributor puppet divided the cookies equally (equal event), gave both cookies to his ingroup member (favors-ingroup event) or gave both cookies to the outgroup individual (favors-outgroup event). Infants who saw the favors-outgroup event and infants who saw the equal event looked reliably longer during the test trials than infants who saw the favors-ingroup event. These findings suggest that infants expected the distributor to favor his ingroup member, thus showing some sensitivity to the ingroup loyalty principle and ranking it above the
fairness principle in this situation. One possible explanation is that when resources are limited, 19-month-olds expect them to be saved for the ingroup.

To explore this idea, in Experiment 5, infants saw identical events except that the distributor puppet had three objects to give instead of only two. Here, when there were adequate resources (one for each individual) infants now expected either an equal distribution or a distribution that favored the ingroup. This result suggests that when there are sufficient resources, 19-month-olds find it acceptable for a distributor to give an object to an outgroup individual, but they don’t view the distributor as obligated to do so, thus showing a sensitivity to both the ingroup loyalty principle and the fairness principle.

Finally, in Experiment 6 I asked whether 19-month-olds would always find an equal distribution acceptable as long as there were sufficient resources, or whether there were conditions where infants would find an equal distribution unexpected, such as when the resources might be needed by the group to complete a task. In this experiment, infants saw human individuals who belonged to different minimal groups marked by distinctive outfits instead of puppets and instead of distributing windfall resources, the experimenter provided instrumental help to one or both individuals by replacing a marker that had run out of ink with a new marker. Just as in Experiment 4, infants who saw the equal event and infants who saw the favors-outgroup event looked reliably longer than infants who saw the favors-ingroup event, suggesting that when resources are needed for a task, 19-month-olds expect them to be kept for the group.

In combination, the results from Experiments 3-6 add to our understanding of how infants in the second year of life expect others to act in a given situation. At 19 months, infants find it acceptable to share resources with an outgroup individual only when the
resources are not scarce or are not needed by the ingroup to complete a task; when resources are scarce or needed, the only acceptable action is to keep the resources for the group. This ability of infants in the second year of life to apply notions of ingroup loyalty and fairness in such different contexts also supports the view that ingroup loyalty is a moral principle that has evolved as a biological adaptation (e.g., Brewer, 1999; Haidt, 2007; Tajfel, 1982). In fact, the results of all six experiments are consistent with a principle-based approach and suggest that as humans we come to the world already equipped with the flexible cognitive architecture necessary to understand the social world around us.
REFERENCES


Fig. 1. Events shown in the experimental condition. In the familiarization trial, two animated puppet penguins (placed on the hands of a hidden assistant) danced from side to side and then paused until the trial ended. In the two test trials, an experimenter brought in two cookies, gave one to one penguin (side was counterbalanced across infants), and then gave the other cookie to either the same penguin (unequal event) or the other penguin (equal event) (order was counterbalanced). As the events unfolded, the experimenter looked naturally at the penguins and at the objects she acted on, but she never made eye contact with the infants. In each test trial, after the experimenter left with her empty plate, the penguins looked down and paused until the trial ended. To help the assistant and experimenter adhere to the events’ scripts, a metronome beat softly once per second. During each testing session, one camera captured an image of the events, and another camera captured an image of the infant. The two images were combined, projected onto a computer monitor located behind the apparatus, and monitored by the supervisor to confirm that the events followed the prescribed scripts. Recorded sessions were also checked off-line for accuracy.
Fig. 2. Events shown in the inanimate-control condition. The familiarization and test events shown in this condition were identical to those in the experimental condition except that the penguins were inanimate: they did not move or talk and simply faced forward throughout the trials.
Fig. 3. Events shown in the cover-control condition. Infants first saw the same familiarization trial as in the experimental condition, with the animated penguins. In the test trials, covers stood over the penguins’ placemats, and the experimenter removed these covers one at a time (order was counterbalanced across infants) to reveal the two cookies. In the equal event, one cookie was in front of each penguin; in the unequal event, both cookies were in front of the same penguin (side was counterbalanced). After the experimenter withdrew, the penguins looked down and paused until the trial ended, as in the experimental condition.
Fig. 4. Mean looking times at the unequal and equal events in the experimental, inanimate-control, and cover-control conditions. The errors bars represent standard errors, and the asterisk denotes a significant difference ($p < .0005$).
Fig. 5. Elmo puppets used in the experimental condition.
Fig. 6. Mean looking times at the unequal and equal events in the experimental, inanimate-control and cover-control conditions. The asterisk denotes a significant difference.
Fig. 7. Distributive events shown in experiment 3. In two identical test trials infants saw a monkey (or giraffe) puppet distribute toys or cookies to two puppets belonging to a different group (type of puppet distributor and recipients were counterbalanced across infants). In each test trial the distributor puppet brought in two objects, and gave both to one recipient (unequal event) or one to each (equal event).
Fig. 8. Distributive events shown in experiment 4. In two identical test trials infants saw a monkey (or giraffe) puppet distribute toys or cookies to another monkey and giraffe (type of puppet distributor was counterbalanced across infants). The distributor puppet either gave both objects to it’s ingroup member (favors-ingroup event), one object to each recipient (equal event) or both to the outgroup member (favors-outgroup event).
Fig. 9. Mean looking times at the unequal and equal events in experiment 3; favors-ingroup, equal and favors-outgroup events in experiment 4 and experiment 5. The asterisks denote a significant difference.
Fig. 10. Events shown in the experimental condition. In the familiarization trials infants saw members of each group either read a book or put a puzzle together (which individuals belonged to which group was counterbalanced across infants). In the orientation trial infants saw members of each group color group-specific pictures. The test trial began with the two individuals at each side attempting to color with broken markers. When the experimenter at the back returned, each individual informed her of her broken marker (which individual spoke first was counterbalanced across infants) and the experimenter either offered a new marker to both individuals (equal event), only to her ingroup member (favors-ingroup event), or only to the outgroup member (favors-outgroup event).
Fig. 10. cont.
Fig. 11. Mean looking times at the favors-ingroup, equal and favors-outgroup events in experiment 6. The asterisk denotes a significant difference.