Young children enlarge the pie: Antecedents of negotiation skills

In press at Journal of Experimental Psychology: General

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Abstract: Negotiations are critical to interpersonal interactions, yet little is known about how the conceptual skills that support successful negotiations develop in childhood and across societies. Here, we presented 384 3–10-year-old children in the United States and India with tasks that measured children's understanding that people can value the same resources differently (Experiments 1–4), and that underlying interests motivate people's stated positions (Experiment 5). In Experiments 1 and 2, children participated in a third-person resource distribution task. Children distributed resources (candies) to two targets who valued resources differently: absolute preferences (liking A but disliking B) or relative preferences (liking both but preferring A to B). By age 5, children differentiated relative from absolute preferences. Experiments 3 and 4 presented a first-person variant of the same task. In trials involving a conflict in which both the child and the target preferred the same resource, U.S. children prioritized their own preferences, whereas Indian children prioritized the targets' preferences. In Experiment 5, all participants from the previous studies participated in an additional task in which two people wanted a single resource, an orange, but their interests differed—one wanted the pulp to make juice and one wanted the peel to make cake. With age, children increasingly proposed the value-maximizing option of splitting the peel from the pulp, rather than halving the orange. Notably, even the youngest Indian children chose the value-maximizing option. Our findings outline the development of two antecedents to successful negotiations and highlight the disparate role of self-interest across cultural contexts.

Keywords: negotiations, development, resource allocations, fairness, cross-cultural

Young children enlarge the pie: Antecedents of negotiation skills

Negotiations are everywhere (Kolb & Williams, 2003). From macro-level discussions about global politics to micro-level decisions about what to eat for dinner, negotiations are a reality of our everyday world. Successful negotiations require a range of skills that rely on conceptual abilities that develop well before adulthood. Here we present a new investigation of the emergence of some of these abilities in young children. We examine the development of two core negotiation abilities in children in the U.S. and India: understanding that people can value resources differently, and understanding that what people state they want is motivated by their underlying interests. Having such insights and the ability to act on them are crucial for efficient negotiations.

Efficient versus suboptimal: Negotiations in adults

Negotiations typically occur over resources. When people agree on how resources would be shared, their agreement might be deemed efficient in cases where the agreement proverbially "leaves no money on the table." More precisely, an agreement is efficient when you cannot improve the value for one party without reducing the value for the other party, ultimately maximizing the value of the resource for all parties (Pareto efficiency; Mock, 2011). Yet negotiations routinely result in inefficient agreements with unrealized potential, where the "total pie" or the added value across parties is less than the possible size of the pie in an efficient solution (Raiffa, 1982). There are numerous reasons for this inefficiency, with one of the central reasons being a zero-sum mentality, which is the perception that one person's gain is necessarily another person's loss. For example, when observers evaluated a negotiation they overlooked mutually beneficial exchanges and instead focused on zero-sum gains or losses (Johnson et al., 2018). Participants exhibit this mentality even more when they themselves take part in the

negotiation, falsely perceiving themselves as being in direct competition with one another, which leads to sub-optimal outcomes. As such, a zero-sum mentality can increase competition, reduce cooperation, and lead both parties to lose out on mutually beneficial outcomes (Niella et al., 2015; L. Thompson & Hastie, 1990). Indeed, zero-sum mentalities can sometimes even result in negotiations that break down entirely (de Dreu et al., 2000; Malhotra & Bazerman, 2007).

A non-zero-sum mentality opens the door to reaching more efficient agreements. One of the most important conceptual antecedents for enlarging the negotiation pie is the appreciation that people often have differential preferences, they value the same resource differently. This is the first conceptual antecedent we explore. For example, imagine Mary and Jane are trying to divide two different toys and two different books. They both like all four items so at first glance a reasonable outcome would seem to be that each will get one toy and one book. However, it turns out that Mary likes the toys much more than she likes the books, and Jane likes the books much more than she likes the toys. Appreciating this differential preference is key to a more efficient solution, namely that Mary will get both toys and Jane both books. Such "logrolling" is an effective method to achieve joint gains when parties have different preferences in a negotiation, by giving concessions on low priority issues in exchange for gains on higher priority issues (Filzmoser & Vetschera, 2008).

This is a fairly simple concept, which most people do understand in theory. But negotiators often fail to take into account that people value resources differently. Instead, they enter a negotiation with a focus on their own subjective values and expected outcomes (Curhan et al., 2006), and are often reticent to reveal information about their true preferences, resulting in reduced joint gains (Liu & Wilson, 2011). Even when participants are evaluating logrolling offers which would increase efficiency and outcomes, they may not waver in their zero-sum

mentality, suggesting that this mentality is deep-rooted (Moran & Ritov, 2002). We focused our investigation on the development of a crucial aspect of the ability to conduct logrolling trades, specifically, on the development of the understanding that people have differential preferences, a key aspect of negotiations that people can leverage to improve deals.

Our investigation also focuses on the emergence of a second concept that is crucial for efficient agreements. A zero-sum mentality can emerge when people view the negotiation through the lens of each party's stated *position*, rather than each party's underlying *interest* (Pasquier et al., 2011). A position-based approach can lead people to think they are in direct competition with one another and, importantly, it narrows the space to explore mutually beneficial outcomes. In contrast, an interest-based approach asks not what people want but why they want it, opening up a range of possible avenues to satisfy the interest. A classic anecdote describes two children with one orange which they both wanted (Fisher & Ury, 2011; Follett, 1940). Responding to their stated positions, their mother gave half the orange to each child. If their mother were to explore their underlying interests — one wanted the peel to use in baking, and the other wanted the inside to make juice — they could have maximized their mutual enjoyment of the orange. Such "bridging" de-emphasizes people's stated position and focuses on the interest that underlies it (Butler, 1996). An interest-based approach allows negotiators to create value, achieve mutual goals, and ultimately expand the pie for all stakeholders (Sebenius, 1992).

Developmental roots of negotiations

Less is known about the conceptual foundations of negotiations. Although it may seem counterintuitive to look to children to understand an ostensibly adult domain like negotiations, children do partake in informal negotiations throughout their childhood, such as when they

negotiate for treats and bedtime with parents. Moreover, existing developmental research on children's desire-based reasoning and theory of mind suggests that children have an early-emerging capacity to negotiate, yet also that these capacities likely change with age.

As early as infancy, children exhibit perspective-taking abilities such as the capacity to think about others' knowledge states, beliefs, and desires (Baillargeon et al., 2010; Ma & Xu, 2011; Onishi, 2005). In fact, children's understanding of others' desires and preferences can even precede their understanding of others' beliefs and knowledge states (Bartsch & Wellman, 1995; Flavell et al., 1990; Gopnik & Slaughter, 1991; Wellman & Woolley, 1990). One such study demonstrating children's precocious ability to reason about desires and preferences involves an experimenter expressing atypical preferences, such as loving broccoli and disliking goldfish crackers. 18-month-olds correctly anticipated which food the experimenter would desire, even though this desire likely differed from their own preferences (Repacholi & Gopnik, 1997). With age, children also make sophisticated predictions about people's preferences, including reasoning about variety versus homogeneity. For example, at 5 years of age children predict that if someone likes two foods equally, they would prefer a serving of both foods rather than just one of the foods (Ahl & Dunham, 2020). It remains an open question how children think about relative preferences and interests, though the best evidence to suggest that children are capable of understanding relative preferences is a recent study in which children learned that a third-party liked chocolates more than cookies, and predicted whether this third-party would accept or reject numerically disadvantageous trades (e.g., trade 2 cookies for 1 chocolate). Five- to ten-year-olds predicted that the third-party would accept numerically disadvantageous trades, indicating an ability to reason about people's differential valuations of items (Echelbarger, Good, et al., 2020). Children's early-emerging ability to reason about others' preferences indicates that the

conceptual tools of understanding differential preferences may emerge early. Open questions concern how these developmental processes change with age, how they might develop across diverse cultures, and how children reason about different types of preference information in situations where they are involved in the transaction.

Likewise, children's concept of fairness emerges and develops early in childhood and across many cultures (Rochat et al., 2009). From infancy, children consider an equal distribution of resources as fair. Even 19-month-old infants seem sensitive to an unequal allocation of resources across individuals (Schmidt & Sommerville, 2011; Sloane et al., 2012). Somewhat counterintuitively, such basic attention and reliance on the need for equality could undermine the efficiency of agreements. Children as young as 3 years of age make resource-allocation decisions based on such a fairness concept and discard a resource to avoid inequity across individuals (McAuliffe et al., 2017; Shaw & Olson, 2012). That is, if they are distributing five pieces of candy between two children, they would give each of them two and throw away one candy. A more efficient distribution through the lens of Pareto efficiency would be to give the fifth candy to one of the children, thereby enlarging the total pie, except that such an efficient solution would violate their concept of fairness. Giving priority to such a concept of fairness has further implication. For instance, in the orange example cutting the orange in half seems to be the most equitable solution, thereby preventing a search for alternatives which are much more efficient. More generally, agreements that are based on differential preferences result in unequal distributions by definition. A focus on fairness as equal distribution, then, could undermine efficient solutions that enlarge the pie by taking advantage of differential preferences. It is worth noting recent evidence demonstrating that children across three cultural contexts did not prioritize equality at all costs, rather, they took into account efficiency when the value of an item

was high (e.g., an iPhone) and did not discard the resource to maintain equality (Choshen-Hillel et al., 2020). Fairness concerns may also extend beyond equality or efficiency and include considerations of needs as well (Huppert et al., 2019; Malti et al., 2016). In this set of studies, we focus specifically on Pareto efficiency, that is, maximizing the value of the resource itself and leaving no proverbial "money" on the table.

In negotiations, fairness considerations could conflict with self-interest. Past research with children in the U.S. demonstrates that children's considerations of their self-interest changes with age, and influences fairness judgments and resource allocation decisions. Although young children generally dislike inequality among other individuals (Rizzo & Killen, 2016), and they certainly complain when they themselves are treated unfairly (Lobue et al., 2011), young children are less opposed to *advantageous inequality* – the type of inequality that benefits them and puts someone else at a disadvantage (Blake & McAuliffe, 2011; Blake & Rand, 2010; McAuliffe et al., 2014; Shaw et al., 2016). For example, when American children divided resources between themselves and someone else, it was only around the age of 7 that they started to avoid prioritizing themselves (Smith et al., 2013). An excessive focus on one's self-interest has the potential to undermine efficient solutions in a negotiation context because it might promote a zero-sum mentality resulting in a smaller pie. The ability to attend to all parties' interests, in turn, could result in much larger pies overall including a larger "slice" for the self.

Understanding how negotiation skills develop will shed light on the cognitive antecedents to negotiations, how they change with age, how they might be shaped by cultural context, and relate to children's developing self-interest. Most of the studies described above with adults and children involved participants in Western contexts. Yet cross-cultural research with adults indicates that negotiation norms can differ between individualist and collectivist cultures (Adair

et al., 2009; Lin & Miller, 2003), often finding an 'other-focused,' less egocentric mindset in collectivist cultures (Gelfand & Realo, 1999). For example, Chinese subjects were more generous than their American counterparts in their allocation of resources between themselves and a partner (Hui et al., 1991), and Japanese participants exhibited less egocentrism in fairness tasks than their U.S. counterparts (Gelfand et al., 2002). Much less research has studied differences across cultures among children (Amir & McAuliffe, 2020) though initial studies provide suggestions that children from individualistic cultures can be more selective in their sharing behaviors than children from India and other collectivist cultures (Birch & Billman, 1986; Rao & Stewart, 1999).

Studies of children can inform when and how negotiation skills emerge, develop and are shaped by culture; they may also provide evidence of thinking that emerges early in life and remains present in adulthood. For instance, although children's performance on perspective-taking tasks improves with age, aspects of its egocentric basis continue (Epley et al., 2004a, 2004b; Surtees & Apperly, 2012). In addition, the emergence of advantageous inequity aversion varies across cultures, with child ren from the U.S. exhibiting this aversion earlier than children in some non-Western cultures (Blake et al., 2015). Thus, studies of children may provide insight into early-developing thinking that continue to guide intuitions into adulthood. Like adults, children engage in informal negotiations with their parents and peers, and these may set the stage for other types of negotiations into adulthood. The current research explores the development of two fundamental tenets of negotiations in two cultural contexts: the ability to think about people as valuing resources differently, and how this is impacted by a child's own self-interest, and the ability to understand people's underlying interests as motivating their stated position.

The Present Studies

Five- to ten-year-old children in Experiments 1 (N = 96 in the U.S.) and 2 (N = 96 in India) were asked to distribute resources between two children that valued the same set of resources differently. In Experiments 3 (N = 96 in the U.S.) and 4 (N = 96 in India), children were asked to divide resources between themselves and another child, who either had conflicting preferences or complementary preferences to them. Experiment 5 includes all participants tested in Experiments 1-4 (N = 384), who participated in a second task in which they were asked to decide how to allocate a single resource between two children who expressed the same position but different underlying interests. Specifically, children were presented with the problem of two people who wanted the same orange, but for different reasons, where one wanted the peel and one wanted the pulp. The children were asked to decide how to divide it. Importantly, in these studies we are not concerned with evaluating the accuracy of children's choices. Children's choices will be discussed in terms of (Pareto) efficiency, but for certain trial types, the "correct" answer is less clear. The overarching goal of the studies is to evaluate whether children are sensitive to differential preferences and interests across ages and in two societies. These studies used a developmental framework to reveal the building blocks of negotiations skills across two cultural contexts. Together, these tasks study the development of children's ability to understand people's differential preferences and underlying interests in deciding how resources should be allocated. Moreover, we explore how considerations of children's own self-interest could undermine their ability to reach a more efficient solution, and whether this plays out differently across two societies.

Choice of testing sites

We tested a sample of children in the Northeastern US. We were also interested in replicating and extending our findings to a non-WEIRD culture (Western, Educated,

Industrialized, Rich, Democratic; Henrich et al., 2010), and so partnered with testing sites in India. We chose India because previous research documents both commonalities and differences in children's self-interest and fairness considerations relative to the United States.

On the one hand, research in India and other collectivist cultures document robust similarities in the development of fairness and equity considerations relative to the U.S. (Blake et al., 2015; House et al., 2020; Rochat et al., 2009). For example, Rochat et al., (2009) found that by 3 years of age, children across seven cultures distributed resources equally between two dolls. Studies conducted specifically in India, though limited, have shown that children in India and the U.S. develop key fairness principles such as disadvantageous inequity aversion at similar ages (Blake et al., 2015). Given these cross-cultural similarities, we expected that children in India would perform similarly to children in the U.S.in our third-person tasks in Experiments 1 and 2.

On the other hand, research also documents the varying role of self-interest across diverse cultures. These findings lend themselves to a few possibilities. First, children in India might show *less* self-interest compared to their U.S. counterparts. Researchers find that children in India and other collectivist cultures show less selfishness and more generosity than their individualist counterparts (Blake et al., 2016; Rochat et al., 2009). Moreover, in a study on children's spontaneous sharing behaviours, researchers found that when put in a situation that gave them a resource advantage, Indian children redistributed these resources spontaneously, but American children did not (Rao & Stewart, 1999). Another possibility is that Indian children show *more* self-interest than children in the U.S. given evidence that an aversion to advantageous inequity emerges later in Indian children compared to U.S. children (Blake et al., 2015; Corbit et al., 2017). Third, there might exist no differences in the role of self-interest between the two societies. In a study conducted in India on young Tibetan children, researchers found that they,

like their Western counterparts were more self-interested in their early years (Robbins et al., 2015). Together, these findings leave open questions regarding how children in non-Western cultures like India might behave in first-person resource distribution tasks, particularly in situations that might incentivize self-interest.

Furthermore, whereas most cross-cultural studies contrast Western and Eastern societies, recent research has documented interesting within-country variability in individualism and interdependence. For example, researchers find that within the same national context, such as in China, rice-farming communities – in which farmers over thousands of years have relied on cooperation and reciprocity – are more interdependent and think more holistically than herding cultures and wheat-farming cultures (Talhelm et al., 2014). Within India, the region we focused on was found to be especially high on collectivism and interdependence, as compared to other regions of India (Talhelm et al., 2015), thus it may be especially well positioned as a comparison site with the Northeastern United States.

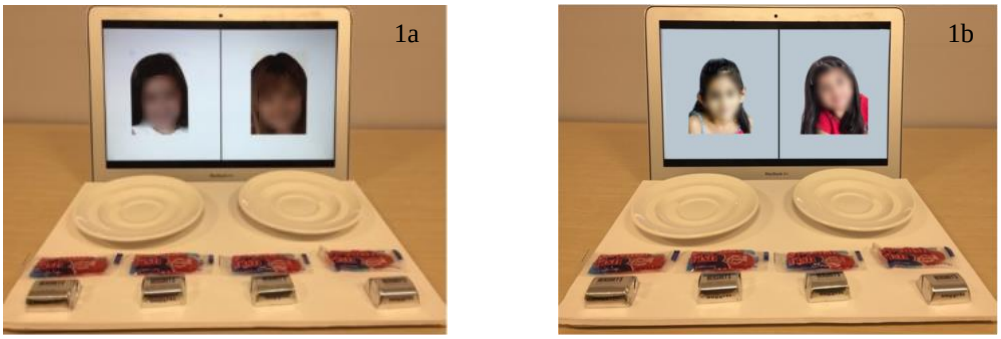
Experiment 1

Experiment 1 investigated children's ability to think about people as valuing resources differently. Using a novel task, we assessed how children distributed resources (candies) among targets who had different preferences for the same resource. This novel paradigm offered insight into the development of one of the core foundations of successful negotiation skills: appreciating that people can have differential preferences, and using that to enlarge the pie.

Method

Participants. We recruited ninety-six 3-10-year-old children (48 girls, 48 boys; M_{age} = 84.40 months; range = 131.6 – 38.6 months; *SD* = 27.23 months). Based on an a priori power analysis assuming a medium effect size and at least 80% power, we needed 86 children. We

rounded up to 96 to have more power and to keep our design counterbalanced across participants and across ages. We chose this age range because children as young as 3 are sensitive to fairness and equity considerations (e.g., McAuliffe et al., 2017; Shaw & Olson, 2012) and we also wanted to test a wide range of ages to establish potential age effects. Children were recruited in a quiet room in the lab, at a preschool, or in a children's museum in the Northeastern U.S. Parents of 87% of participants provided information about their children's race and ethnicity: 3% Asian or Asian-American, 82% European or European-American, 1% Hispanic/Latine, 5% mixed-race/ethnicity, and 9% Other – See Supplemental Materials S6 for further demographic information. Participants were compensated with a small toy or stickers, and parents were offered a $10 gift card.



Figures 1a-b. Candy stimulus setup: 4 gummies, 4 chocolates, and two plates (one for each target) in Experiment 1 USA (Figure 1a) and Experiment 2 India (Figure 1b). Visuals blurred for publication; visuals were not blurred when presented to participants.

Procedure and Material. Using a within-subjects design, we presented participants with two targets on a computer screen. As Figures 1a-b show, each target had a plate in front of them, and participants were asked to distribute 4 pieces of chocolate and 4 gummies between the two targets. The faces of the target children on the screen included 24 White children (12 girls, 12 boys). We used an MTurk sample (N = 100) to match the faces for age and attractiveness (M_{age} = 6.33). No face significantly differed from each other on age or attractiveness ratings – See

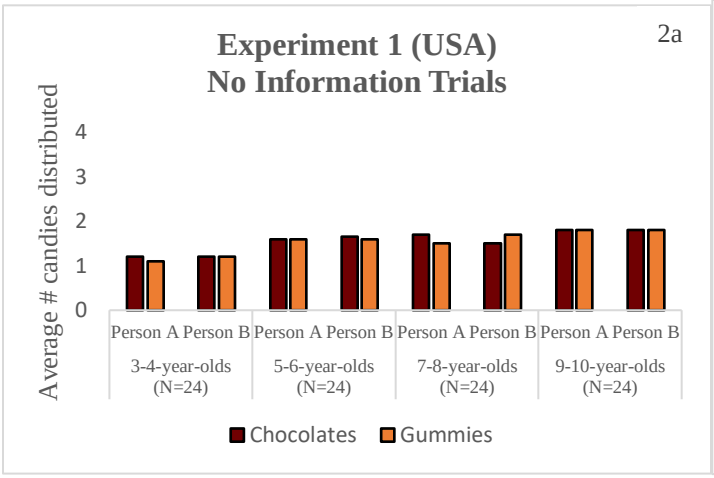
Supplemental Materials Tables S1-S2. We informed participants about the preferences that each of the two target children on the screen had for the candy. There were three preference trials, each repeated twice, in a counterbalanced, randomized order: 1) *No Information,* in which the targets' preferences were explicitly unknown. This trial would reflect baseline distribution when the preferences of the recipients are not known. 2) *Absolute Preference,* in which one target liked only chocolates but not gummies (C \ G), and the other target liked only gummies but not chocolates (G \ C). This trial would assess the participants' ability to take preferences of the recipients into account, as an even distribution is not an efficient solution. 3) *Relative Preference,* in which both targets liked both candies, but one liked chocolates more than gummies (C $\cap$ G) and the other liked gummies more than chocolate (G $\cap$ C). Similar to the *Absolute Preference* trial, here children could enlarge the pie by using information about preferences, but it requires a more nuanced understanding of preferences as relative, and an efficient solution would necessarily require an "unequal" distribution of candies within each candy type. We counterbalanced in the *Absolute Preference* and *Relative Preference* trials whether the target on the left liked gummies (more) or chocolates (more). Participants were allowed to distribute as many of the candies as they wanted, leftover candies went to no one. See Supplemental Materials S3 for full script. The procedure was approved by our university's Institutional Review Board (IRB19-1629).

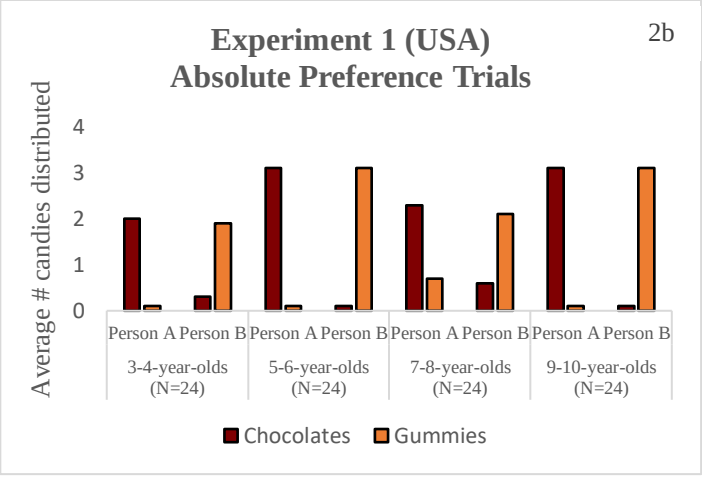
Analysis Plan. Results were coded in two ways: (1) *Average Candies Distributed*. We compared the mean number of chocolates and gummies distributed to each target for each trial type using a repeated measures one-way ANOVA. We followed up on significant results with post hoc comparisons using Tukey adjustments to determine the direction of the mean difference. (2) *Pattern of Distribution.* We coded whether the candy was shared in an Even distribution,

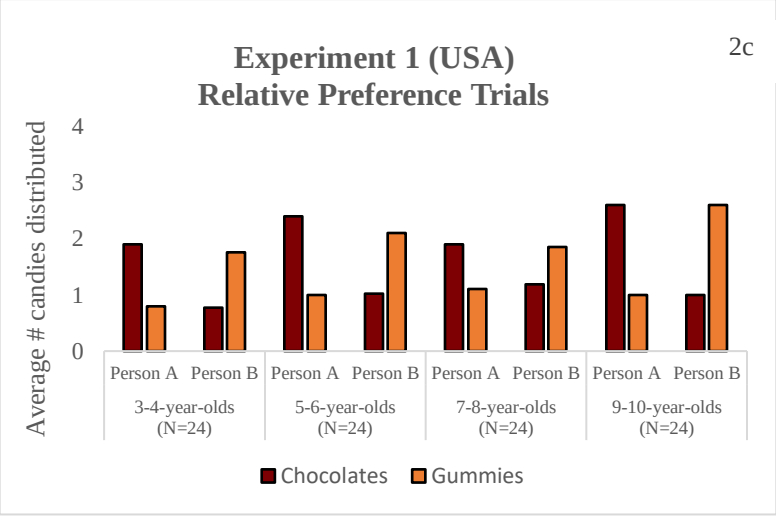
meaning an equal number of each candy type to each target, an Absolute distribution, one candy type to Target A, and the other candy type to Target B, a Relative distribution, meaning relatively more of one candy type to Target A and relatively more of the other candy type to Target B, aligned with the targets' preference, or other type of distribution – See Appendix A for full coding scheme. For each trial type (e.g., *Absolute Preference Trials*) we constructed a generalized linear mixed effects model (GLMER) with a binomial distribution and logit link using the lme4 package (Bates et al., 2015) in R Studio. We included subject as a random effect because each child participated in multiple trials. To determine which predictors (i.e., among Age, Gender, and Community Center) to include in our model, we ran likelihood ratio tests, which revealed that Age accounted for significant variance in our data, $p < .001$.This final model, using Age as a continuous predictor, was used to examine children's age on their likelihood of choosing one of four distribution types: Even, Absolute, Relative, or Other – See Appendix A for coding scheme.

Results

Average Candies Distributed. In the *No Information* trials, we found no significant differences in the average number of candies distributed between the two children, $F(3,380) = 1.11$, $p = 0.345$. We observed significant differences in the average number of candies distributed in the *Absolute Preference* trials, $F(3, 380) = 117.6$, $p < .001$, $\eta^2 = .481$ and *Relative Preference* trials, $F(3, 380) = 51.99$, $p < .001$, $\eta^2 = .291$. Participants distributed more chocolates to the child who liked only chocolates ($M_{chocolate} = 2.63$, $SD = 1.48$) or who liked chocolates more than gummies ($M_{chocolate} = 2.20$, $SD = 1.00$) — both p's $< .001$, and participants distributed more gummies to the target who liked only gummies ($M_{gummies} = 2.55$, $SD = 1.53$) or who liked gummies more than chocolates ($M_{gummies} = 2.08$, $SD = 1.06$) — both p's $< .001$; See Figures 2a-c.







Figures 2a-c. Experiment 1 (U.S. sample). Average number of chocolates and gummies distributed in the *No Information* trials (Figure 2a), *Absolute Preference* trials (Figure 2b), and *Relative Preference* trials (Figure 2c). In the *No Information* trials, candy preferences for Person A and Person B are unknown. In the *Absolute Preference* trials, Person A likes only chocolates (C \ G) and Person B likes only gummies (G \ C). In the *Relative Preference* trials, Person A likes both, but likes chocolate more than gummies (C $\overset{\frown}{\cap}$ G) and Person B likes both, but likes gummies more than chocolates (G $\overset{\frown}{\cap}$ C).

Pattern of Distribution. Children's distribution patterns varied across the three trials (See Table 1). In the *No Information* trials, children used an Even distribution 71% of the time, an Absolute distribution 25% of the time, and an Other distribution 4% of the time. With age, children were more likely to use an Even distribution pattern, *ß* = 0.166, *SE* =.059, OR = 1.18, *p*

< .005. In the *Absolute Preference* trials, children used an Absolute distribution 93% of the time, an Other distribution 6% of the time, and a Relative distribution 1% of the time, with no age differences, all *p's* > .90. In the *Relative Preference* trials, children used a Relative distribution 50% of the time, an Absolute distribution 26% of the time, an Even distribution 15% of the time, and an Other distribution 9% of the time. With age, children were more likely to use a Relative distribution pattern, *ß* = 0.284, *SE* = .079, OR = 1.33, *p* < .001, and less likely to use an Even distribution pattern, *ß* = -0.104, *SE* = 0.05, OR = .901, *p* < .037.

	No Information Trials				**Absolute Preference Trials**				**Relative Preference Trials**			
	Even Pattern	**Absolute Pattern**	**Relative Pattern**	**Other**	**Even Pattern**	**Absolute Pattern**	**Relative Pattern**	**Other**	**Even Pattern**	**Absolute Pattern**	**Relative Pattern**	**Other**
3-4yrs	20	22	0	6	0	44	0	4	18	24	2	4
5-6yrs	33	14	0	1	0	47	1	0	10	8	22	8
7-8yrs	36	12	0	0	0	40	0	8	2	13	28	5
9-10yrs	48	0	0	0	0	48	0	0	0	4	44	0

Table 1: Experiment 1 (U.S. Sample). Pattern of distribution in the *No Information* trials, *Absolute Preference* trials and *Relative Preference* trials. Number of times children distributed the candies evenly (Even pattern), gave each target only their preferred candy (Absolute pattern), gave each target both types of candy, but gave more to the target that liked that candy more (Relative pattern) or did something else (Other). See Appendix A for detailed coding scheme.

Discussion

Participants in the U.S. distributed resources in line with the targets' preferences. In trials in which participants received no information about the targets' preferences, participants generally distributed the candies evenly such that the targets had identical plates. In other words, participants gave each target two chocolates and two gummies. Three- and four-year-olds in these trials used both an Even and an Absolute distribution pattern; a closer examination of children within this age group who spontaneously gave their reasoning (*n* = 7) suggests that they were making superficial feature-based inferences about the targets' preferences (*n* = 5). An

increased use of the Even distribution pattern with age might reflect children's increased tendency to favor variety (Echelbarger, Maimaran, et al., 2020).

Interestingly, only in the *Absolute Preference* trials did U.S. children across ages systematically give each target only the candy that they liked, by distributing all the chocolates to the target that liked only chocolates, and distributing all the gummies to the target that liked only gummies. That is, children as young as 3-years-old were capable of encoding targets' absolute preferences and using this information to find a much more efficient solution than an equal distribution.

In the *Relative Preference* trials, by age 5, participants' distributions reflected the targets' relative preferences. For example, a participant might have distributed 3 chocolates and 1 gummy to the target that liked chocolates more than gummies, and 3 gummies and 1 chocolate to the target that liked gummies more than chocolates. Children at this age were thus able to reflect more nuanced preference information in their resource allocations. These findings might be explained by evidence suggesting that older children are more inclined to seek variety than younger children (Echelbarger & Gelman, 2017). That is, older but not younger children in this study might reason that even if a person likes one candy type more, they'd prefer having some of each candy type over having all of their preferred candy; this is in line with recent findings by Ahl & Dunham (2020) showing that when preferences between two foods are equal, with age children predict that people would want a little bit of both foods rather than just one of the foods.

Younger children distributed fewer candies on average than older children. This may be explained by a number of factors. First, younger children may have been more uncertain about their choices, thus distributing a fewer number of candies. Second, younger children may be better able to make numerical judgments for smaller distributions rather than larger distributions,

thus choosing the former approach. Third, younger children may have felt that each target would have too many resources if they distributed all possible resources.

Overall, U.S. children's distribution of resources was sensitive to preferences. Whereas even the youngest children in our sample made efficient decisions in cases where preference information was absolute, it is only by age 5 that children's distribution pattern reflected relative preferences. These findings provide evidence of children's early attention to people's differential evaluations of resources, a conceptual ability that is central to enlarging the pie towards more efficient negotiation agreements. Next we examined these issues with children living in a different cultural context.

Experiment 2

In Experiment 1, we observed that by age 5, children efficiently used targets' relative preferences to make decisions about how to allocate resources, therefore demonstrating their sensitivity to information that different people can value resources differentially. To examine the robustness and generalizability of this developmental trajectory, we replicated this method with a sample of children in a non-Western culture - India. Given existing research documenting robust similarities in the development of fairness and equity considerations across multiple cultures, particularly in third-person tasks (e.g., Blake et al., 2015; House et al., 2020; Rochat et al., 2009), we expected that children in India would perform similarly to children in the US.

Method

Participants. Ninety-six 3-10-year-old Indian children participated in this experiment (48 girls, 48 boys; M_{age} = 90.88 months; range = 125.00 – 60.00 months; *SD* = 20.92 months). Children were recruited from four schools (*n* = 75) and two community centers (*n* = 21) in Chennai, India (See Supplemental Materials S7 for further demographic information).

Participants were compensated with a small prize, and schools and community centers were offered compensation of $5 (320 rupees) per participating child.

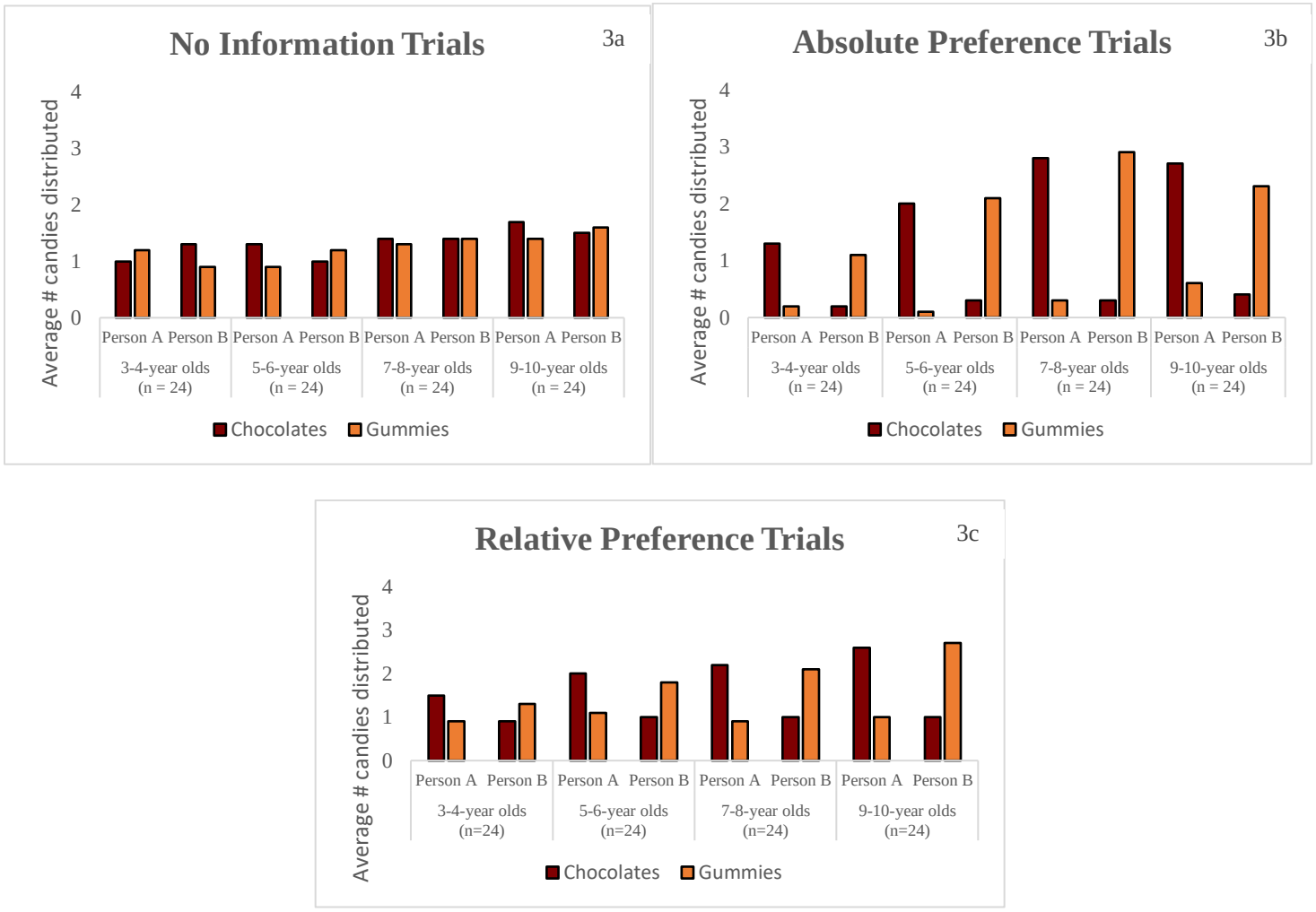
Procedure and Materials. The procedure was identical to Experiment 1, except that the faces of the children on the computer were Indian, again matched on age and attractiveness (M_{age} = 6.20; no face significantly differed from each other in age or attractiveness), and that the gummy candy was named with the locally appropriate name "jelly candy". The research team was the same as Experiment 1, with the addition of a local individual fluent in English and Tamil. The experiment was conducted in English, unless participants were not proficient or comfortable speaking in English, in which case it was conducted in Tamil (n = 21). The Tamil script was translated by a native local Tamil speaker, and validated by another. The procedure was approved by our university's Institutional Review Board (IRB19-1629).

Analysis Plan. Our analysis plan was identical to that of Experiment 1.

Results

Average Candies Distributed. Using a repeated measures one-way ANOVA, we compared the mean number of chocolates and gummies distributed between Person A and Person B for each trial. In the *No Information* trials, we found no significant differences in the average number of candies distributed between Person A and Person B, $F(3, 380) = 0.013$, $p < .998$. However, once again, we observed differences in the *Absolute Preference* trials, $F(3, 380) = 92.99$, $p < .001$, $\eta^2 = .423$, and *Relative Preference* trials, $F(3, 380) = 67.63$, $p < .001$, $\eta^2 = .348$. Post hoc pairwise t-tests revealed that participants distributed more chocolates to the target who only liked chocolates ($M_{chocolates} = 2.20$; $SD = 1.37$) or liked chocolates more than gummies ($M_{chocolates} = 2.08$; $SD = 0.88$) — both p's < .001, and participants distributed more gummies to

the target who liked only gummies ($M_{gummies}$ = 2.10; *SD* = 1.29) or liked gummies more than chocolates ($M_{gummies}$ = 1.98; *SD* = 0.80) — both *p*'s < .001; See Figures 3a-c.



Figures 3a-c. Experiment 2 (India). Average number of chocolates and gummies distributed in the *No Information* trials (Figure 3a), *Absolute Preference* trials (Figure 3b), and *Relative Preference* trials (Figure 3c). In the *No Information* trials, candy preferences for Person A and Person B are unknown. In the *Absolute Preference* trials, Person A likes only chocolates (C \ G) and Person B likes only gummies (G \ C). In the *Relative Preference* trials, Person A likes both, but likes chocolate more than gummies (C $\cap$ G) and Person B likes both, but likes gummies more than chocolates (G $\cap$ C).

Pattern of Distribution. Like our U.S. sample in Experiment 1, children's distribution patterns varied across the three trials (Table 2). In the *No Information* trials, children used an

Even distribution 72% of the time, an Absolute distribution 16% of the time, a Relative distribution 6% of the time, and an Other distribution 6% of the time, with no age differences, all *p*'s > 0.46. In the *Absolute Preference* trials children used an Absolute distribution 79% of the time, an Even distribution 12% of the time, an Other distribution 8% of the time, and a Relative distribution 1% of the time, with no age differences, all *p*'s > 0.38. In the *Relative Preference* trials children used a Relative distribution pattern 50% of the time, an Even distribution pattern 28% of the time, an Absolute distribution pattern 16% of the time, and an Other distribution pattern 6% of the time. With age, children were more likely to use a Relative distribution pattern, *ß* = 0.547, *SE*=0.182, OR = 1.728, $p < 0.003$, and less likely use an Even distribution pattern *ß* = -0.497, *SE*=0.201, OR = .608, $p < .013$.

In examining the distribution patterns exclusively among the youngest children in our U.S. and India samples, we observed that in the *Relative Preference* trials, whereas children in India used a Relative distribution pattern 25% of the time, children in the U.S. only used this pattern 4% of the time, a difference that was statistically significant, $\chi^2(1) = 7.14$, $p = 0.008$.

	No Information Trials				**Absolute Preference Trials**				**Relative Preference Trials**			
	Even Pattern	**Absolute Pattern**	**Relative Pattern**	**Other**	**Even Pattern**	**Absolute Pattern**	**Relative Pattern**	**Other**	**Even Pattern**	**Absolute Pattern**	**Relative Pattern**	**Other**
3-4yrs	35	10	1	2	13	33	0	2	24	8	12	4
5-6yrs	25	19	1	3	2	42	1	3	11	10	22	5
7-8yrs	38	1	4	5	3	40	2	3	11	7	30	0
9-10yrs	41	1	4	2	5	36	0	7	8	6	32	2

Table 2. Experiment 2 (India) pattern of distribution in the *No Information* trials, *Absolute Preference* trials and *Relative Preference* trials. Number of times children distributed the candies evenly (Even pattern), gave each target only their preferred candy (Absolute pattern), gave each target both types of candy, but gave more to the target that liked that candy (Relative pattern) or did something else (Other). See Appendix A for detailed coding scheme.

Discussion

Overall, children in India showed the same sensitivity to preferences as children in the US. With no information about the targets' preference, children shared the candies evenly. In the *Absolute Preference* trials, like children in the U.S., children in India reliably used an Absolute distribution across ages. Similarly, in the *Relative Preference* trials, by age 5 children used an efficient distribution, a Relative distribution pattern. Notably, we also found evidence that an attention to relative preferences may emerge even earlier in development in our Indian sample than in our U.S. sample.

Across two societies, we find evidence that by around 5-years-old, children capitalize on differential preferences when they allocate resources. We also find slight variation in the emergence of this ability between the two societies, wherein young children in India demonstrated some appreciation of relative preferences beginning by 3-4 years of age. Nonetheless, children from both societies only reliably used this pattern by age 5. Again, these findings demonstrate children's sophisticated reasoning about people's differential preferences, an ability that is central to the development of skills that are necessary for efficient agreements.

Experiment 3

Experiments 1 and 2 examined an important precursor to successful negotiations: children's ability to think about other people as valuing resources differently. In Experiment 3, we examined children's ability to use differential preferences to increase efficiency when they were an interested party. To do this, children distributed resources between themselves and a series of targets who varied in their preferences for the candies. Although children may be capable of understanding and reflecting relative preferences by age 5, they may employ different strategies when they are themselves involved in the negotiations. We were particularly interested in how children resolve situations in which their interests conflict with someone else's. A large

body of research indicates that adults and children act differently when they make decisions for others compared to when they make decisions for themselves, the latter allowing them to act in their own self-interest (Birch & Billman, 1986; Eisenberg-Berg et al., 1979; Golan & Day, 2008; McGuire et al., 2000; Prencipe & Zelazo, 2005; Sun et al., 2008). To assess how children use information about differential preferences when they are affected by their decisions, we modified the task presented in Experiments 1-2 to involve children as interested parties. In addition to examining their appreciation of relative preferences (as in Experiments 1 and 2), we also put children in a situation involving a conflict between the child's own preference and the target's preference.

Method

Participants. As with experiments 1 and 2, we recruited ninety-six 3-10-year-old children (48 girls, 48 boys; M_{age} = 83.77 months; range = 135.7 – 40.1 months; *SD* = 27.47 months). Two additional children signed up to participate but were excluded because they did not meet the *Relative Preference Induction* phase criteria described below. We conducted the experiment in a quiet room in the lab, at a preschool or in a children's museum in the Northeastern U.S. Race and ethnicity were provided for 70% of participants: 3% Asian or Asian-American, 82% European or European-American, 3% Hawaiian, 5% mixed-race/ethnicity, and 7% Other – See Supplemental Materials S6 for further demographic information. In addition to the candies they allocated to themselves in the study, participants were compensated with a small toy or stickers, and parents were offered a $10 gift card.

Figures 4a-b. Candy stimulus setup: 4 gummies, 4 chocolates, and two plates (one for the participant and one for the target) in Experiment 3 USA (Figure 4a) and Experiment 4 India (Figure 4b). Visuals blurred for publication; visuals were not blurred when presented to participants.

Procedure and Materials. On each trial, participants were presented with a single child on the screen, matched to the participants' gender (See Figures 4a-b). Participants were tasked with distributing candies between themselves and the target child on the screen by putting their candy on the plate in front of them, and putting the target child's candy on the plate in front of the target.

Before the experiment began, participants took part in a *Relative Preference Induction* phase with the goal of putting participants in the mindset of having relative preferences for the two candies. First, participants were asked which candy type they liked more: chocolates or gummies. After they made their choice, it was reiterated to them that they liked both, but liked one more than the other. For example, "you like both, but you like chocolates more than gummies". Four children said they liked both candies equally; these children were asked which candy they would choose if they had to pick one. We excluded one child who still was unable to pick one candy type, and one child who did not like either of the candies. As a result, across trials and throughout the experiment, participants had a relative preference that remained

constant (e.g., participant likes G ∩ C). The target children had one of three candy preferences representing three trial types: 1) *Opposite Relative Preference* in which the target had diametrically opposite relative preferences to the participant (e.g., target likes C ∩ G), 2) *Low-Conflict* in which the target had an absolute preference for the candy the participant preferred less (e.g., target likes C \ G), 3) *High-Conflict* in which the target had an absolute preference for the candy the participant preferred more (e.g., target likes G \ C). We repeated each trial twice, in a counterbalanced, pre-set randomized order. Participants were allowed to distribute as many or few of the candies as they wanted. After the experiment, participants could take home the candies they allotted to themselves. See Supplemental Materials S4 for full script. The procedure was approved by our university's Institutional Review Board (IRB19-1629).

Analysis Plan. For each trial type (i.e., *Relative Preference*, *Low-Conflict,* and *High-Conflict*), we used t-tests with Bonferroni adjustments to compare the mean number of preferred candies (Candy X) and less preferred candies (Candy Y) distributed between the participant and the target. In addition to these analyses, for the *Relative Preference* trials, we also examined children's pattern of distribution to mirror the analysis from Experiments 1 and 2. And for the *High-Conflict* trials, we examined children's self-oriented versus target- oriented distribution patterns once again using the "glmer" function in R's lme4 package (Bates et al., 2015).

Results

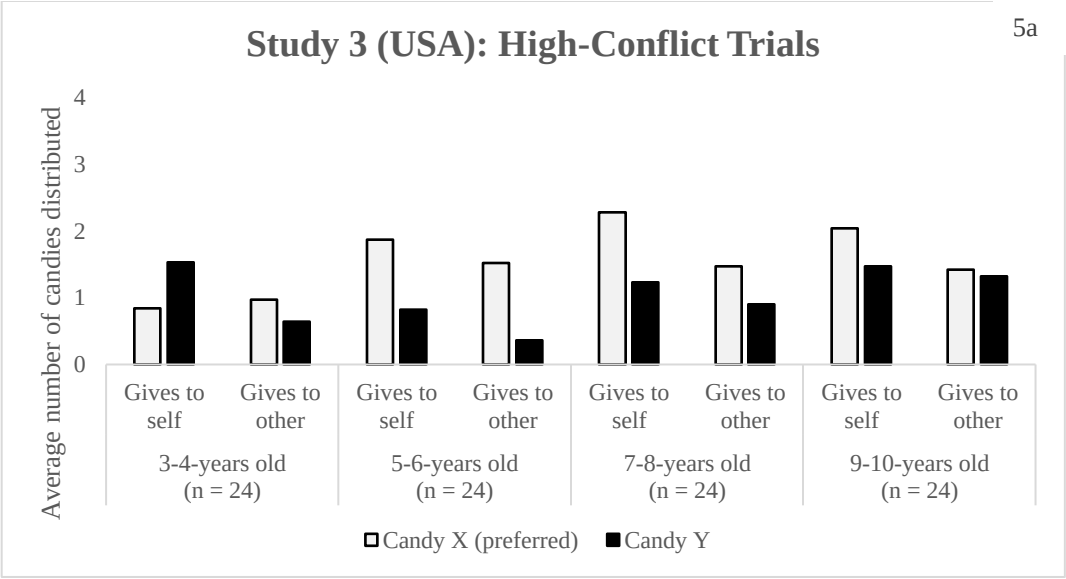
Opposite Relative Preference Trials. When the participant and target had diametrically opposed relative preferences (i.e., *participant*: Candy X ∩ Candy Y; *target*: Candy Y ∩ Candy X), participants took more of their preferred candy ($M_{participant}$ = 1.73) and gave less to the target (M_{target} = 1.06), $t(95) = 6.031$, $p < .001$, d = .871. Similarly, they gave the target more of the target's preferred candy (M_{target} = 1.72) and took less for themselves ($M_{participant}$ = 1.20), $t(95)$ =

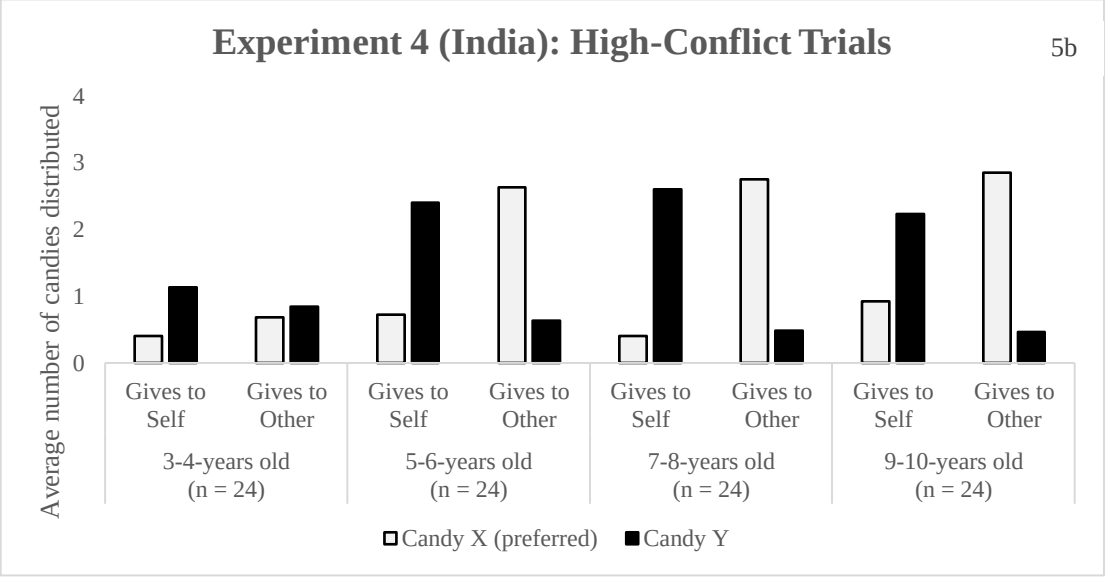
4.039, $p < .001$, d = .583. This pattern emerged robustly at around age 7, $F(1,94) = 22.79$, $\eta^2 = .195$, $p < .001$. We also examined children's pattern of distribution to mirror the approach used in Experiments 1 and 2. Children used a Relative distribution pattern 44% of the time, an Even pattern 27% of the time, an Absolute pattern 22% of the time, and another distribution pattern 7% of the time. With age, children were less likely to use an Even distribution pattern, ß = -.490, *SE* = 0.235, OR = 0.613, $p < .037$, and more likely to use a Relative distribution pattern, a pattern that emerged around age 7, ß = 1.351, *SE* = 0.410, OR = 3.860, $p < .001$.

Low-Conflict Trials. In trials where the participant had a relative preference and the target had an absolute preference for the participant's less preferred candy (i.e., *participant*: Candy X ⊓ Candy Y; *target*: Candy Y \ Candy X), children took more of their preferred candy for themselves ($M_{participant} = 1.65$) than for the target ($M_{target} = 0.37$), $t(95) = 8.869$, $p < .001$, d = 1.338. Mirroring this pattern, participants gave more of the target's preferred candy to the target ($M_{target} = 1.72$) than to themselves $M_{participant} = 0.94$), $t(95) = 4.726$, $p < .001$, d = .704. We did not observe age-related differences, $p > .526$.

High-Conflict Trials. In trials where the participant had a relative preference and the target had an absolute preference for the participant's preferred candy (i.e., *participant*: Candy X ⊓ Candy Y; *target*: Candy X \ Candy Y), children gave significantly more of the preferred candy to themselves ($M_{participant} = 1.76$) than to the target ($M_{target} = 1.34$), $t(95) = 2.948$, $p < .004$, d = .430. For the participants' less preferred candy, which the target disliked, children gave significantly more of the less preferred candy to themselves ($M_{participant} = 1.26$) than to the target ($M_{target} = 0.80$), $t(95) = 2.423$, $p < .016$, d = .355 – See Figure 5a. In addition, we examined children's pattern of distribution on these trials. We classified children's distribution choices as *even* (i.e., where the candies are distributed evenly between both the participant and the target),

self-oriented (i.e., distributing more or all of the preferred candy to themselves), *target-oriented* (i.e., distributing more or all of the preferred candy to the target), or *Other* – See Table 3. Children used a *self-oriented* pattern 43% of the time, an *even* pattern 40% of the time, a *target-oriented* pattern 16% of the time, and an *Other* pattern 1% of the time (See Table 3). We observed no age-related patterns, all *p*'s > .534.





Figures 5a-b. Average number of candies distributed between the participant and the target in Experiment 3 (participants tested the U.S., Figure 5a) and Experiment 4 (participants tested in India, Figure 5b). Across both experiments, the *High Conflict* trials, the participant likes both

candies, but likes candy X more than candy Y (X ⊓ Y). The target likes only candy X and dislikes Candy Y (X \ Y).

	Experiment 3 (USA)				Experiment 4 (India)			
	Even	**Self-oriented**	**Target-oriented**	**Other**	**Even**	**Self-oriented**	**Target-oriented**	**Other**
3-4yrs	18	21	8	0	13	18	12	3
5-6yrs	25	18	2	1	6	6	35	0
7-8yrs	16	20	10	1	7	2	38	0
9-10yrs	14	20	9	1	8	5	33	0

Table 3. Pattern of distribution in the *High-Conflict* trials in the U.S. and India. Number of times children distributed candies evenly (*even*), distributed candies in a way that privileged themselves (*self-oriented*), distributed candies in a way that privileged the target (*target-oriented*), or *Other*. See Appendix B for detailed coding scheme.

Discussion

In the *Relative Preference* trials, children were introduced to the same relative preference scenario as in Experiments 1 and 2, except this time children had to distribute resources between themselves and a target who had diametrically opposite relative preferences. By age 7, children distributed candies efficiently, in accordance with differential preference information, which is later than when they were a third-party to the exchange. Children between 3- to 6-years old primarily relied on an even or an absolute distribution pattern. Although it is unsurprising that 3-4-year-olds did not demonstrate an appreciation of relative preference, which is in line with our findings from Experiment 1, it is somewhat surprising that 5-6-year-olds did not reliably use a relative distribution pattern, particularly because the findings from Experiment 1 would indicate that by age 5 children have the capacity to appreciate relative preferences. One interpretation for this difference is that younger children might have found it more cognitively taxing to suspend their own preferences to focus on their own and their targets' collective preferences, leading to a less optimal distribution. Another possibility is that participants may have liked their preferred candy to a greater extent than they liked the other candy, although if this were the case, we might expect younger children to rely more heavily on an absolute distribution than an even

distribution, which we did not observe. On a broader level, we observed a similar trend such that with age, children were able to act on relative preferences and produce efficient resource allocations, even when they were interested parties in the negotiations.

To more closely examine the role of self-interest in children's resource allocations, we introduced children to low-conflict trials and high-conflict trials. In the *Low-Conflict* trials where the participant had a relative preference and the target had an absolute preference for the participant's less preferred candy participants across ages gave themselves their preferred candy and gave the target the target's preferred candy, representing an efficient agreement. In the *High-Conflict* trials where the participant had a relative preference and the target had an absolute preference for the participant's preferred candy children by age 5 generally gave themselves more or all of the preferred candy. Further examinations of children's patterns of distribution revealed that children mainly engaged in self-serving or even distribution patterns.

In Experiment 3, we found that when their preferences were in conflict with someone else, children engaged in self-interested behaviors at the expense of another person's preferences in a negotiation task. To examine how self-interest plays out in a society with different norms around sharing than the U.S. (Rao & Stewart, 1999), we tested children in India.

Experiment 4

In Experiment 4, we examined how self-interest plays out in a different cultural context to see the extent to which these findings extend to a non-WEIRD sample. Existing research documents interesting potential differences in the role of self-interest across cultures, suggests that children in India could show *more* self-interest than children in the U.S. (see Blake et al., 2015), *less* self-interest than children in the U.S. (see Blake et al., 2016; Rao & Stewart, 1999; Rochat et al., 2009), or show the *same* level of self-interest as children in the U.S. (see Robbins et al., 2015).

Method

Participants. Ninety-six 3-10-year-old Indian children participated in this experiment (48 girls, 48 boys; M_{age} = 90.00 months; range = 120.00 – 60.00 months). Children were recruited from two schools (n = 71) and two community centers (n = 25) in Chennai, India – See Supplemental Materials S7 for further demographic information. Participants were compensated with a small prize, and schools and community centers were offered compensation of $5 USD (320 rupees) per participating child.

Procedure and Materials. The procedure was identical to Experiment 3, except that we used faces of Indian children from Experiment 2 (see Figure 4b). An additional three participants signed up to participate but we did not test them because they did not show a preference for either candy. The procedure was approved by our university's Institutional Review Board (IRB19-1629).

Analysis Plan. Our analysis plan was identical to that of Experiment 3.

Results

Opposite Relative Preference Trials. When the participant and the target preferred different candies, participants took for themselves more of their preferred candy ($M_{participant}$ = 1.44) and gave fewer to the target (M_{target} = 0.77), $t(95) = 7.351$, $p < .001$, d = 1.042. Similarly, participants gave the target more of the target's preferred candy (M_{target} = 1.53) than they took for themselves ($M_{participant}$ = 0.78), $t(95) = 8.082$, $p < .001$, d = 1.157. This pattern emerged robustly at around age 5, $F(1,96) = 77.32$, $\eta^2 = .451$, $p < .001$. In examining children's pattern of distribution, we observed that children used a Relative distribution pattern 51% of the time, an Even distribution pattern 24% of the time, an Absolute pattern 13% of the time, and another type of distribution pattern 12% of the time. With age, children were less likely to use an Even

distribution pattern, *ß* = -.521, *SE* = 0.185, OR = .594, $p < 0.005$ and more likely to use a Relative pattern, *ß* = 1.452, *SE* = 0.365, OR = 4.27, $p < .001$.

Low-Conflict Trials. When the participant and target had differing candy preferences (i.e., *participant*: Candy X ⊓ Candy Y; *target*: Candy Y \ Candy X), children took for themselves more of their preferred candy ($M_{participant} = 1.92$) and gave less to the target ($M_{target} = 0.26$), $t(95)=11.932$, $p < .001$, d = 1.803. Mirroring this pattern, participants gave the target more of the target's preferred candy ($M_{target} = 2.18$) and took less for themselves ($M_{participant} = 0.44$), $t(95) = 11.975$, $p < .001$, d = 1.737. We did not observe any age-related patterns, p's < 1.

High-Conflict Trials. When the participant and the target preferred the same candy (i.e., *participant*: Candy X ⊓ Candy Y; *target*: Candy X \ Candy Y), children gave significantly more of their preferred candy to the target ($M_{target} = 2.23$) than to themselves ($M_{participant} = 0.61$), $t(95) = 9.886$, $p < .001$, d = 1.480. For the participants' less preferred candy, which the target disliked, children took more of this candy for themselves ($M_{participant} = 2.09$) than they gave to the target ($M_{target} = 0.60$), $t(95) = 8.397$, $p < .001$, d = 1.245. This pattern emerged around age 5, $F(1,96) = 23.51$, $\eta^2 = .202$, $p < .001$ (See Figure 5b). We next examined children's pattern of distribution on these trials using the same four classifications as in Experiment 3 (See Table 3). Children used a *target-oriented* pattern 63% of the time, an *even* pattern 18% of the time, a *self-oriented* pattern 17% of the time, and an *Other* pattern 2% of the time. With age, children were more likely to use an *other-oriented* pattern, $F(1,93) = 23.51$, $\eta^2 = .201$, $p < .001$. All other age-related patterns were nonsignificant, all p's > .113.

Discussion

In the *Relative Preference* trials (i.e., when the participant had a relative preference and the target had an opposite relative preference), by age 5, children in India reliably distributed

candies efficiently, in accordance with this relative preference information – earlier than in the U.S. sample in Experiment 3. One possibility is that younger children in India may have more advanced inhibitory control than their U.S. counterparts (Oh & Lewis, 2008), rendering them better able to separate their own preferences from the targets' preferences. This account is further corroborated by the fact that unlike their U.S. counterparts, performing a first-person version of this resource allocation task did not seem to disrupt or delay Indian children's use of a relative distribution compared to their Indian counterparts in the third-person task in Experiment 2.

Once again, we capitalized on this first-person negotiation paradigm to examine the role of self-interest in children's resource allocations. In *Low-Conflict* trials (i.e., where the participant had a relative preference and the target had an absolute preference for the participants' less preferred candy), like children in the U.S., children in India generally acted efficiently, taking for themselves their preferred candy and giving the target their preferred candy. Interestingly, though children in both the U.S. and India generally used an Even distribution pattern on these trials, younger children in the U.S. were more likely to use a Self-oriented distribution pattern than their counterparts in India, providing further evidence of the differential role of self-interest in resource distributions across two societies.

Strikingly, in *High-Conflict* trials (i.e., where the participant had a relative preference and the target had an absolute preference for the participants' preferred candy), by 5 years of age, children in India generally gave themselves the less preferred candy, and gave the target the preferred candy. An examination of their distribution pattern revealed that Indian children robustly distributed in an *other-oriented* pattern. This is in stark contrast to our U.S. sample who distributed the candies in a self-oriented or even pattern. This choice of distribution may be considered efficient given that taking the less preferred candy would represent a lesser loss to the

participant, who likes both candies, than it would to the target, who only likes the one candy. As a result, children in India provided value to both parties instead of just one party, thus enlarging the overall pie. Aside from this, children from each sample may also vary in their goal construal; children in India may have a more interdependent construal of goals and as a result, may not perceive prioritizing their partner as costly in the same way that children in the U.S. may perceive it. In this vein, relationship values of their collectivist culture may have led children in India to construe this cost as being negligible or lending itself to reciprocity in the future.

Together, Experiments 1-4 capture children's ability to appreciate that people can value resources differently, and that self-interest impacts children's ability to engage in optimal resource distributions. Thus far we have focused primarily on children's understanding of relative preferences, but another related aspect of negotiations is an appreciation of underlying interests. In many ways, an understanding of *interests* represents a precursor to understanding that people can have different stated preferences. That is, differential interests can form the basis from which differential preferences arise. In Experiment 5 we turn to the development of this fundamental precursor of negotiations.

Experiment 5: Children's understanding of underlying *interests*

Experiment 5 examined a second precursor to negotiations: the ability to appreciate that underlying *interests* motivate stated *positions*. That is, when people state what they want (their position), understanding why they want it (their interest), can help in finding a more efficient solution. A focus on positions can lead the parties to perceive the value of a resource as "fixed", thus leading them to see themselves as being in conflict with each other. Instead, a focus on interests can expand the value of the resource for both parties. In this study, children were introduced to the orange dilemma we mentioned before: this is a situation where two people

ostensibly valued a resource similarly (i.e., a single orange), thus presenting a zero-sum conflict. However, a closer examination revealed that they were interested in different aspects of the resource. We examined children's ability to look past people's stated positions and instead focus on people's underlying *interests*.

Method

Participants. All participants (N = 384) tested in Experiments 1-4 took part in this second task.

Figure 6. Still image from video depicting two people stating their (same) position and (different) interests in Experiment 5. Visuals blurred for publication; visuals were not blurred when presented to participants.

Procedure. After participating in the resource distribution task, children from Experiments 1-4 watched a video of two people who expressed their desire to take the single orange placed between them (See Figure 6). At this point, the experimenter paused the video and reiterated the targets' *position*: both people want the orange. The video continued and this time both targets expressed why they wanted the orange: one wanted the inside to make orange juice, and the other wanted the outside to make a cake. The experimenter again paused the video and reiterated the targets' *interests.* In the final scene, both targets in the video declared that they wanted the orange. At the end of the video, children were asked what the targets should do with

the orange – See Supplemental Materials S5 for full script. The procedure was approved by our university's Institutional Review Board (IRB19-1629).

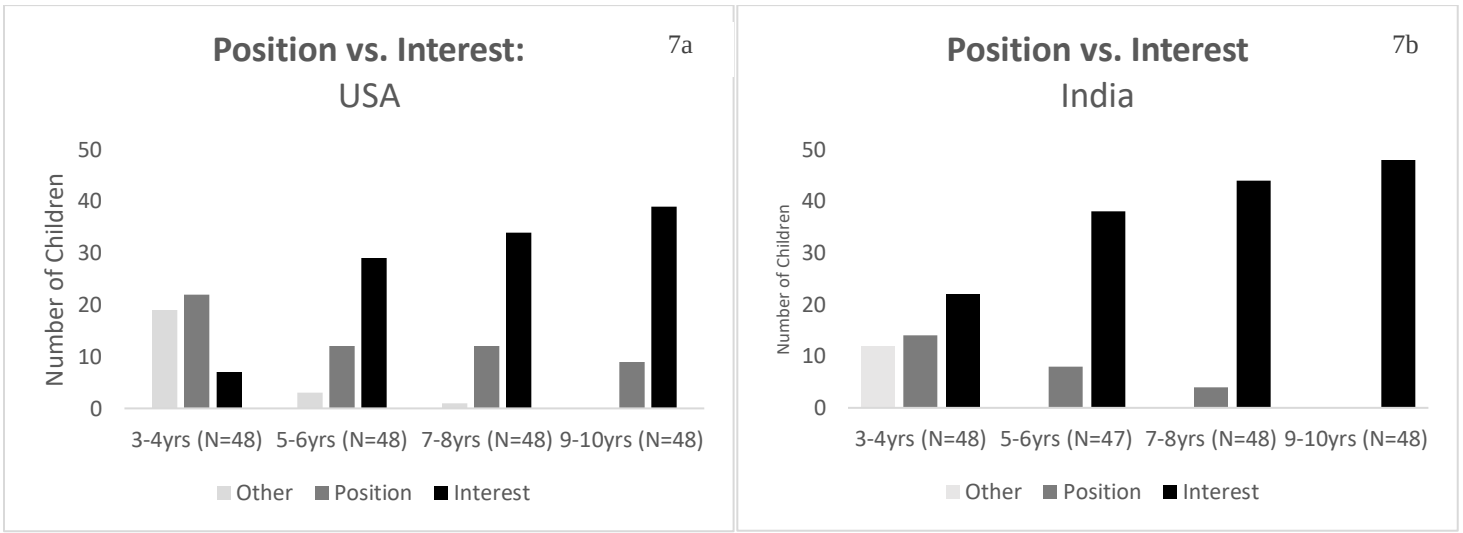
Coding. Responses were coded in one of three ways: 1) *position-based*: children decided to split the orange in half; 2) *interest-based:* children decided to give the inside to the person who wanted to make juice, and the peel to the person who wanted to use it for baking; and 3) *other*. We first report the proportion of times each approach was chosen. Next, to examine how children's approach changed with age and between the two populations, we constructed a binomial logistic regression using the "glm" function in R Studio with Age, Population, and their interaction as predictors. Finally, we examined the relationship between children's choice of a relative distribution pattern in the Candy Task with their choice of an interest-based approach in the Orange Task using a binomial logistic regression, once again using the "glm" function in R Studio.

Results

Overall, children chose an *interest-based* approach 68% of the time, a *position-based* approach 22% of the time, and an *other* approach 10% of the time. A binomial regression revealed a main effect of Age — with age, children from both societies were more likely to use an interest-based approach and less likely to use a position-based approach, $ß = 0.397$, $SE = .110$, OR = 1.488, $p < .001$. Notably, 3-4-year-old Indian children were more likely to use an interest-based approach than a position-based approach compared to their American counterparts ($\chi^2 = 7.759$, $p < .005$; See Figures 7a-b.). We found no differences for other age groups, p's > .258.

We also examined the relationship between children's choices in the resource distribution task and their choice of a position- or interest-based approach in Experiment 5. First, we ran a binomial logistic regression using Age and Experiment [1-4] as predictors to examine whether

children's choices in the *Relative Preference* trials from Experiments 1-4 predicted their choice in the Orange Task. We observed a main effect of Experiment such that those Indian children who used a relative distribution pattern at least once in the third-person Candy Task (Experiment 2), were more likely to choose the value-maximizing option in the Orange Task, $ß = 2.611$, $SE = 1.158$, $p < .024$. We also observed a marginal interaction between Age and Experiment, driven by the youngest children (3-4-year-olds) in Experiment 2 (India), $ß = .313$, $SE = .160$, $p < .050$. No other results were significant, p's > .203. Indeed, among the fourteen 3-4-year-old Indian children in Experiment 2 who chose the value-maximizing option in the Orange Task, 9 of these children used a relative distribution pattern at least once in the Candy Task. Second, we examined whether children's choice of self-oriented versus other-oriented distribution pattern in Experiments 3 and 4 predicted their choices in the Orange task. These results were not significant, p's > .13.



Figures 7a-b. Interest-based approach increases with age in the U.S. (7a) and India (7b) in Experiment 5.

Discussion

By 5-years of age, children in both cultural contexts were able to look past each targets' position and instead make efficient resource allocation decisions based on the targets' underlying interests. That is, instead of focusing on each party's ostensibly competing position as they both wanted the orange, children made their decisions based on the targets' specific interests, as each target needed a different part of the orange to achieve their goals. Whether younger children used a position-based approach because they believed it to be the superior option, or because an interest-based approach did not spontaneously occur to them remains an open question. One especially interesting follow-up would be to provide children with interest-based solutions in one situation and then see if they spontaneously apply it in a different situation.

Notably, children in India exhibited an interest-based approach earlier in development than children in the U.S. Whereas a majority of 3-4-year-old Indian children focused on *interests*, a majority of their American counterparts focused on *positions*. One possibility is that younger children in India may have more experience with exchanging and sharing resources with siblings and other family members due to larger family sizes (Calvi et al., 2021).

In Experiment 5, we did not ask children to justify their choices, though some children nonetheless made spontaneous comments throughout the study which we recorded verbatim. In reviewing these comments, we found that in only a minority of instances did children provide meaningful explanations for their choices (n = 12, representing .03% of all participants). Future research might try to explicitly ask children for justifications to see if they are able to articulate an awareness of the conceptual tools we find here. Additional open questions concern the relationship between children's understanding of relative preferences and their understanding of underlying interests. For example, thinking about relative preferences in the Candy Task might have facilitated thinking about underlying interests in the Orange Task. In this study, we

observed that the relationship between the Candy Task and Orange Task was strongest for Indian children participating in the third-person version of the task. Future research might seek to explore this relationship systematically.

Overall, these findings provide further evidence that the conceptual antecedents to negotiation skills: the appreciation of the integrative potential of differential preferences and that of focusing on interests. These conceptual abilities come online reliably by around age 5 and may emerge slightly earlier in some societies.

General Discussion

As nascent negotiators, children as young as 5 years of age showed the emergence of two conceptual tools that are necessary for efficient agreements: they appreciated that people can value the same resource differently, and they understood how different interests may motivate people's stated positions. First, when children in the U.S. and in India were asked to divide candies between children who valued the same resource differently, they took advantage of relative preferences in order to enlarge the pie by age 5. Second, by the same age, children made the value-maximizing decision of looking past the people's position and instead focused on their different underlying interests. These conceptual antecedents to negotiation skills come online early in development, and may form the initial building blocks for successful negotiations.

By testing a wide age range across two societies, we were able to observe age-related changes in the emergence of these skills. In Experiments 1 and 2, when children were asked to distribute two resources between people who had absolute preferences, in the sense that they liked only chocolates or only gummies, even the youngest children in our sample used an efficient distribution pattern than aligned the two resources with the targets' preferences. In contrast, when the targets' preferences were relative in the sense that the targets liked both

candy, but one liked chocolates more, and the other liked gummies more, three- and four-year-olds' allocations were more mixed. Only by age 5 did children started to use such relative preference information in their resource allocation decisions, giving more chocolates to the target that preferred chocolates, and more gummies to the target that preferred gummies. In Experiments 3 and 4, using a first-person variant of this task, children only started to reliably use a relative distribution pattern by age 7 in the U.S., and by age 5 in India. In Experiment 5, with age, children were able to make more efficient resource allocation decisions by looking past stated positions and focusing instead on interests.

The age-related changes that we found raise interesting issues. One point to note is that the developmental time course we observed in the emergence of thinking about relative preferences may follow the developmental trajectory of thinking about relative need (Huppert et al., 2019; Malti et al., 2016), though open questions still surround the potentially unique interaction between age and culture. Nevertheless, in exploring the mechanisms at play, one possibility is that reasoning about preferences and interests is more cognitively challenging for younger children. Information that is as extreme as absolute preferences may be easier to represent for even young children, whereas they may be less able to track more complex relative preference information. Indeed, younger children may also have a more difficult time suspending their own preferences in order to represent others' preferences. Another possibility is that older children may also be more inclined to seek variety than younger children (see Ahl & Dunham, 2020; Echelbarger & Gelman, 2017), though this may be modulated by the framing of negotiation itself, which might lead to more variety- or consistency-oriented behavior (Fishbach et al., 2011).

We found preliminary evidence that these two conceptual abilities may emerge later in the U.S. than in India. In Experiments 1 and 2, we observed that children in India demonstrated an understanding of relative preferences earlier than children in the U.S. That is, 3-4-year-old Indian children were significantly more likely to use a relative distribution pattern compared to their counterparts in the U.S. In Experiments 3 and 4, when children themselves partook in the negotiations, we saw a similar developmental trajectory whereby with age, children were more likely to use a relative distribution pattern. Likewise in Experiment 5, children in India employed the value-maximizing strategy earlier than in the U.S. Although children from both samples were similar in socioeconomic background and parents' education level, the differences we observed between our U.S. and India samples may be attributed in part to differences in demographic factors we did not capture – See Supplemental Materials S6-S7 for more demographic information. Interesting open questions concern how and why these skills emerge differently across societies, and in different cultural contexts *within* a given society. Related literature has observed that children in India may have enhanced numerical literacy, working memory capacity, and may be encouraged to engage in other-oriented behaviors, allowing them to practice these skills earlier in development (Gordon, 2004; Rao & Stewart, 1999; Saxe, 1982; Saxe & Posner, 1983). Further research is needed to better understand the range of developmental factors and experiences that contribute to these cultural differences.

The role of self-interest differed dramatically between our U.S. and India samples. Experiments 3 and 4 presented children with high-conflict trials in which children distributed resources between themselves and a target – in which the participant had a relative preference for A over B, whereas the target only liked A and disliked B. Children in the U.S. took more of the preferred candy, and even gave the target the candy the target did not like at all; children in India

took for themselves the candy they liked relatively less, and gave the target their preferred candy. In other words, children in the U.S. prioritized their self-interest, whereas children in India prioritized the target's interests. Note that under some conditions, the solution of the Indian children might have been considered more efficient, given the overall distribution of resources. The U.S. children provided value only to themselves as they gave the other child a candy that has no value for them. The Indian children provided value to both parties as they gave the other child a candy they valued and took for themselves a candy they liked less but still valued. These differences between the U.S. and India children may be attributed to differences in perspective-taking abilities, cultural norms, and even underlying differences in conceptions of fairness and goal pursuit. For children in India, where a collectivist cultural environment emphasizes communality (Verma & Triandis, 1999), construals of fairness may hinge on reciprocity where immediate cost is buffered by long-term gains. For this reason, in a collectivist culture, conceptions of goals may also be more likely to prioritize others' preferences. These results indicate that the development of the conceptual abilities that support negotiations also hinge on the unique cultural contexts in which they are developing. Indeed, the specific region of India we tested in is considered highly interdependent, with a history of collectively farming rice (Talhelm et al., 2015), so open questions concern how children's self-interest might manifest similarly or differently in more individualistic regions of India with a history of farming wheat, such as in Delhi, or even in more collectivist regions of the U.S. such as in the South (Vandello & Cohen, 1999).

These findings also relate to existing literature that considers the development of children's equity-efficiency tradeoffs. Past research indicates that children's desire to uphold fairness and equity norms can often result in inefficient resource allocation decisions (Shaw &

Olson, 2012), though children do take into account efficiency when the value of an item is high (Choshen-Hillel et al., 2020). We demonstrate that despite children's ability to attend to both equity and efficiency, equity considerations can be overlooked by self-interest, sometimes leading to inefficient outcomes. Moreover, these equity-efficiency tradeoffs varied dramatically across cultures. Children in India prioritized not only an equity-oriented, but an other-oriented approach, thus providing value to both parties. Children in the U.S. on the other hand prioritized their self-interest, thus providing value more selectively to themselves.

Several open questions are motivated by these findings. First, the current studies are different from real negotiations because a single person made decisions on behalf of others, Negotiations in the real world do not take place between targets on the screen, but between real people facing real consequences. It also requires the other person to agree to the deal. On the one hand, negotiating with an actual person may decrease self-interest as a result of perceived pushback. On the other hand, it may increase self-interest because of a heightened sense of competition which might promote a stronger zero-sum mentality. In light of the literature on negotiation among adult, we might expect children to enlarge the pie less often in real-world negotiations. Future work might address these possibilities by having participants negotiate with known individuals, strangers, or with confederates in both single-shot and multi-shot settings (see Gal & Pfeffer, 2007; Mannix et al., 1995; Thompson, 2006). Negotiation behaviors may also change when aspects such as power (see Wolfe & Mcginn, 2005), or pre-existing relationships (see Greenhalgh, 1987), or gender roles (see Arnold & McAuliffe, 2021) come into play. Moreover, open questions also concern how the *type* of resource being distributed (e.g., durable vs. perishable goods) might affect negotiations, though we expect that children will reason similarly about durable resources as they did about the perishable resources used in this

set of studies (see Fawcett & Markson, 2010). Further research may explicitly examine the ways in which these proposed moderators shift the emergence, the development, and the outcome of negotiations.

Future work might expand the scope of research on children's reasoning about relative preferences and underlying interests. For example, examining relative preferences for a *domain* or *set* of items rather than for a specific resource. To go back to an earlier example, imagine Mary and Jane are trying to divide three different toys and three different books. Both Mary and Jane have their own 3-tier subjective ranking for the items within each domain. Instead of comparing their valuations of each individual item, it might be helpful to know that Mary really cares about which toys she gets, whereas Jane is indifferent between the toys and the books. A closer examination of more complex or nuanced relative preference scenarios will help to paint a more comprehensive picture of the development of when, how, and in what contexts children are able to appreciate that people can value resources differently. Indeed, in some cases it may not be possible to negotiate outside a zero-sum framework, and goals can extend well beyond Pareto efficiency concerns such as to build and maintain relationships; future research might unpack these types of negotiations as well. Finally, in our paradigms, we explicitly offered information about the targets' differential preferences and interests. In a typical negotiation, this information is not volunteered so readily, and so future work might examine at what point children not only start to inquire about their counterparty's preferences and interests, but also the extent to which children spontaneously consider different negotiation outcomes. Like older children, adults may be capable of using relative preference and interest information when this is made readily available (e.g., Loewenstein & Thompson, 2006), but the more interesting questions arguably concern in what contexts children and adults would spontaneously seek this information.

Using a novel task, we investigated important milestones in the early conceptual skills that are necessary to support efficient negotiated agreements. A deeper understanding of children's negotiation abilities is useful in thinking about how children solve problems and resolve conflicts in their own lives as children. Moreover, given that the antecedents to negotiations emerge over the course of development and appear differently in different contexts, developmental and cross-cultural research in this space could be useful for educators as they engage in training the next generation of negotiators. Rather than trying to undo negotiation tropes at their end state, a developmental focus is uniquely positioned to change the developmental trajectory of these conceptual abilities as they develop.

Context paragraph

The concept of children as inchoate negotiators arose from casual discussions among the authors, particularly upon observations of their own children's precocious negotiation skills. They observed that extant work on negotiations was (quite understandably) entrenched in the adult world, leaving open questions concerning the ontogeny and development of negotiations. Bridging Dr. Keysar's research on judgment and decision-making, with Dr. Kinzler's work on children's social and cognitive development, the authors sought to investigate negotiations from a developmental lens. In addition, having worked across cultural groups within their respective disciplines, all three authors were also interested in examining these questions across societies.

Acknowledgements

We thank Ramya Moorthy for her testing support and the children and staff at our local sites: Bala Vidya Mandir, Chudar Center, Grove School, KC High, Sprouts, and Vignesh Educational Trust. We thank Molly Gibian and Cassidy Wolfe for their help with logistics, stimuli creation, and data management and Dnyanesh Kulkarni for his shorthand advice. We also thank Caitlyn J Finton and Mary Kate Koch for their acting prowess in our video stimuli. Finally, we thank Sunita Sah (Cornell Johnson Graduate School of Management), Thomas Talhelm (University of Chicago Booth School of Business), and Margaret Echelbarger (University of Chicago Booth School of Business) for providing thoughtful feedback on this project and in the early drafts of this article.

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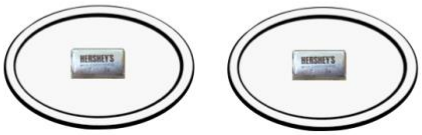
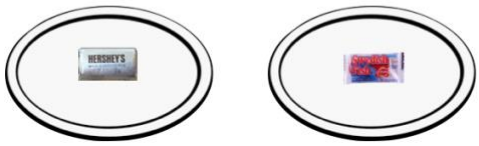
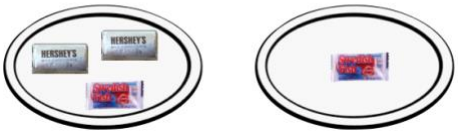
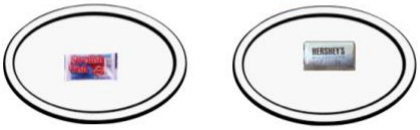
Appendix A

Coding scheme for Pattern of Distribution in Experiments 1 and 2

	Examples
Even Pattern Participants distribute the same number and type of candy to each target (plates are identical).	**Example 1:** Target A Target B  **Example 2:** 
Absolute Pattern Participants distribute one candy type to Target A, and the other candy type to Target B, aligning this distribution to the targets' preferences.	**Example 1:** Target A likes only chocolates Target B likes only gummies  **Example 2:** 

Relative pattern Participants distribute relatively more of one candy to Target A and relatively more of the other candy to Target B, aligning this distribution to the targets' preferences.	**Example 1:** Target A likes both, chocolates more Target B likes both, gummies more  **Example 2:** 
Other Participants employ an even, relative, or absolute distribution in the opposite direction of the targets' preferences. One target gets no candy.	**Example 1:** Target A likes both, chocolates more Target B chocolates likes only gummies  **Example 2:** 

Appendix B

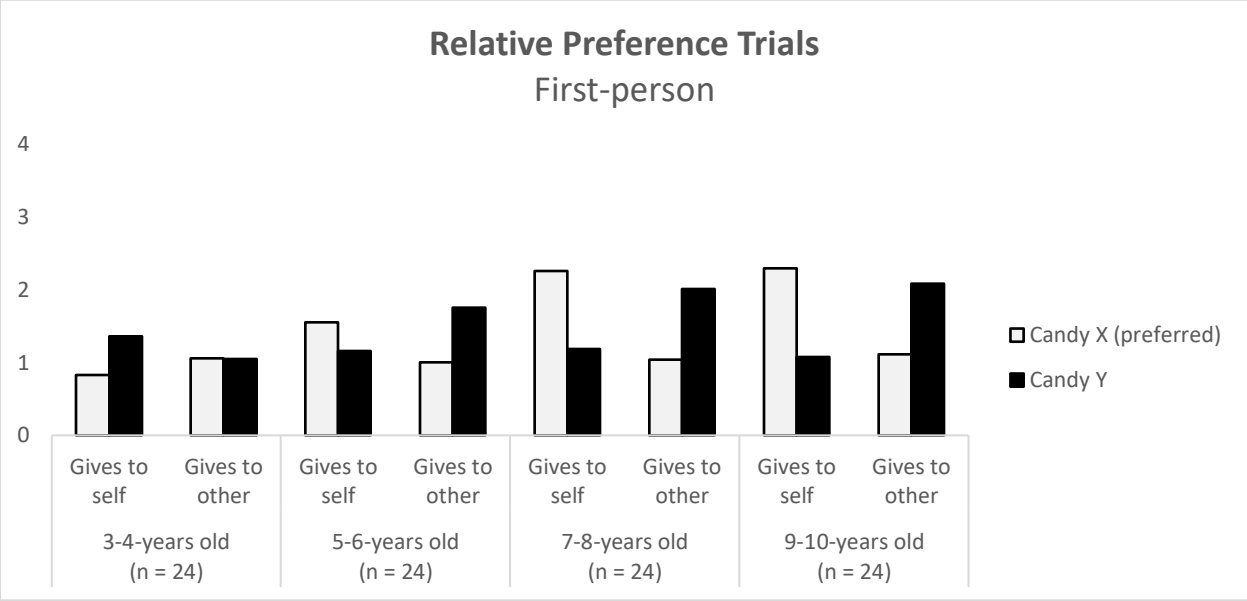
Coding Scheme for pattern of distribution in Experiments 3 and 4

***Example**: Both the participant and the target prefer chocolates over gummies (participant: C ⊓ G; target C \ G). This table displays the coding scheme for the distribution of the preferred candy (chocolates).*

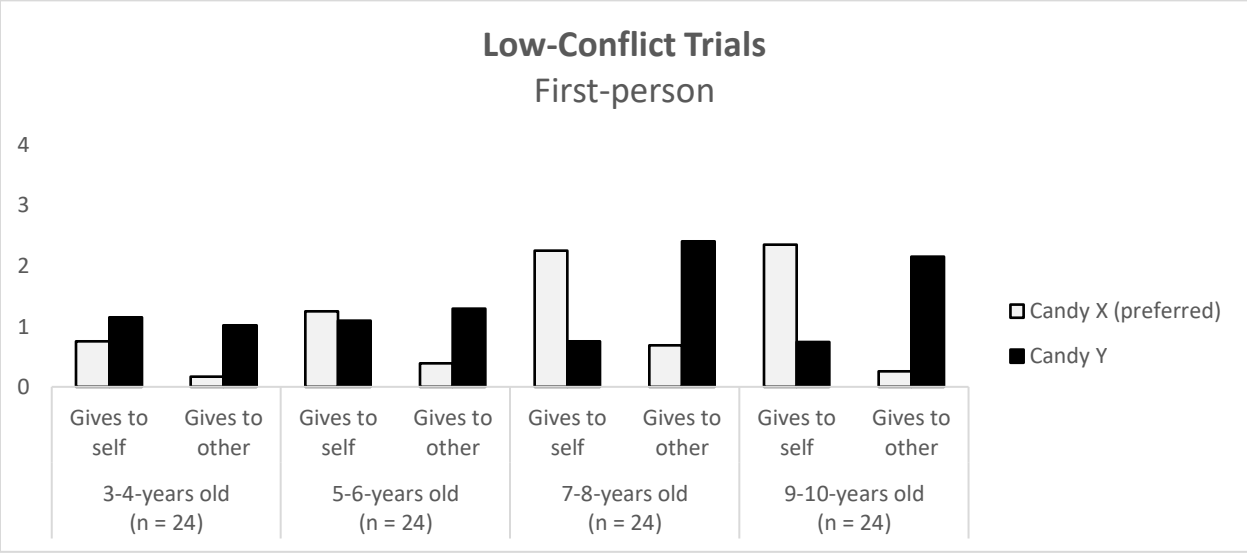
	Gives to self	**Gives to target**
Even Candies split evenly between both targets		
Self-oriented More or all of the preferred candy distributed to the self		
Target-oriented More or all of the preferred candy distributed to the target		
Other Preferred candy not distributed		

Appendix C

Average number of candies distributed in the Relative Preference and Low-Conflict Trials (USA)

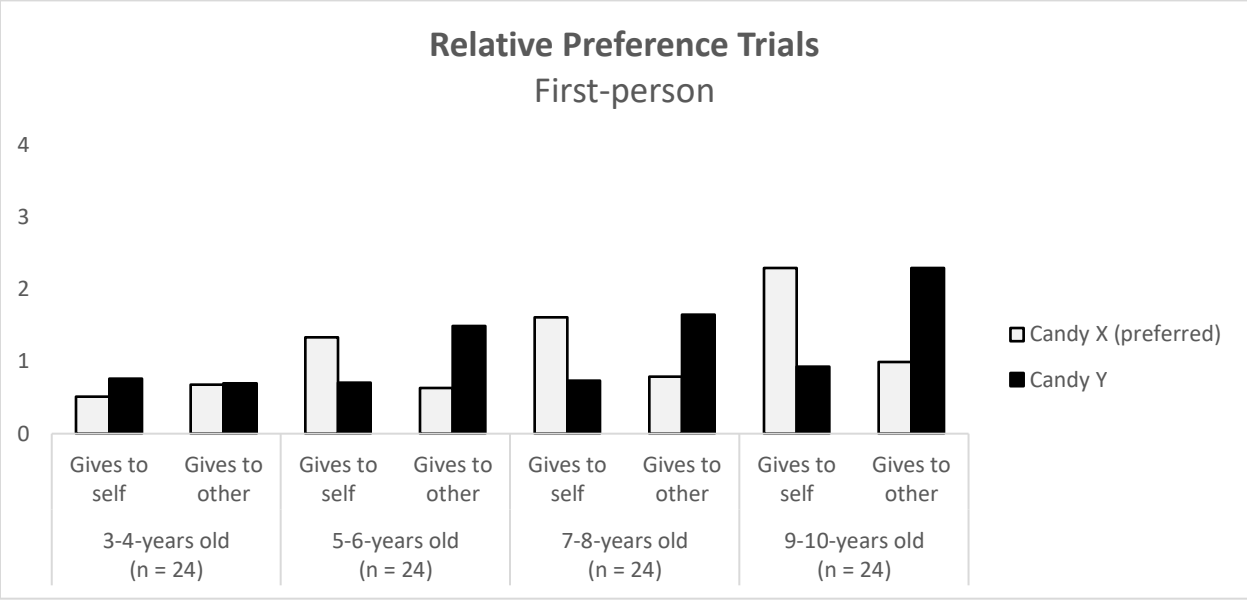


Note. *Participant likes Candy X ⍩ Candy Y. Target likes Candy Y ⍩ Candy X.*

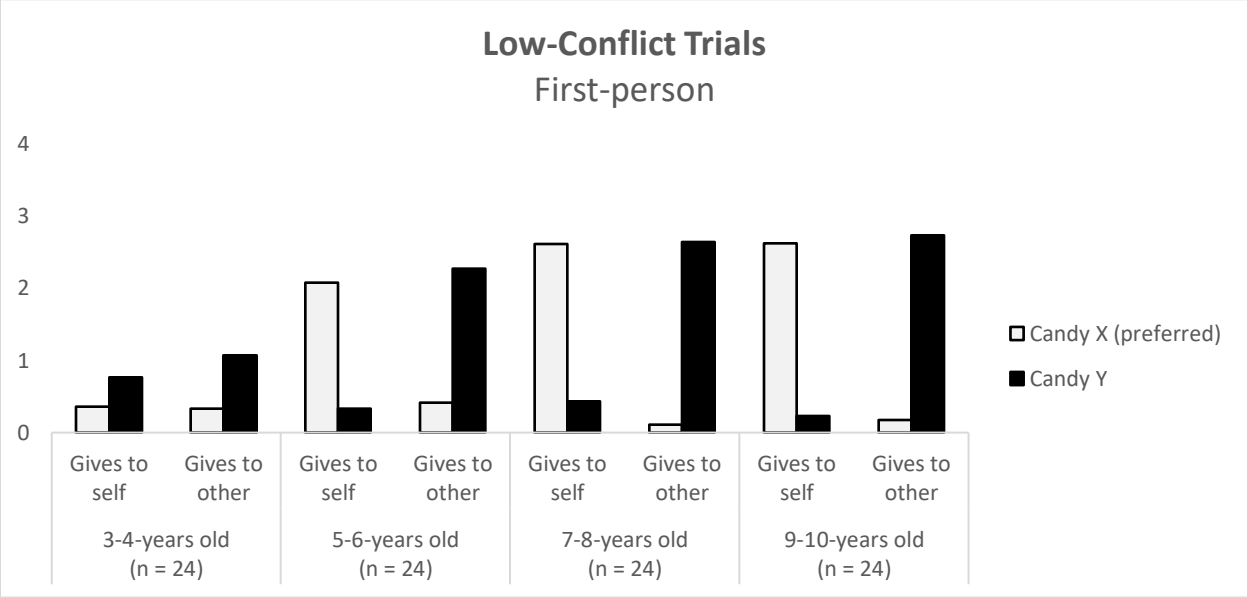


Note. *Participant likes Candy X ⍩ Candy Y. Target likes only Candy Y.*

Average number of candies distributed in the Relative Preference and Low-Conflict Trials (India)



Note. *Participant likes Candy X ⍩ Candy Y. Target likes Candy Y ⍩ Candy X.*



Note. *Participant likes Candy X ⍩ Candy Y. Target likes only Candy Y.*