

## The development of trust and altruism during childhood



Anthony M. Evans<sup>a,\*</sup>, Ursula Athenstaedt<sup>b</sup>, Joachim I. Krueger<sup>c</sup>

<sup>a</sup> Department of Social Psychology, Tilburg University, Tilburg, The Netherlands

<sup>b</sup> Department of Psychology, University of Graz, Austria

<sup>c</sup> Department of Cognitive, Linguistic, and Psychological Sciences, Brown University, United States

### ARTICLE INFO

#### Article history:

Received 20 November 2012

Received in revised form 19 February 2013

Accepted 25 February 2013

Available online 13 March 2013

#### JEL classifications:

C70

C91

#### PsycINFO classifications:

3020

#### Keywords:

Trust

Altruism

Perspective-taking

### ABSTRACT

Knowing when to trust is an essential skill, but little is known about its cognitive development. No previous studies have examined the development of trust while controlling for age differences in altruism. We hypothesized that older children are more likely to trust, and that this age-related increase is not due to an increase in altruism. In two experiments, we compared the choices of kindergarten (4–5 years) and elementary school (9–10 years) children in economic games. Age was positively related to both trust and altruism, but more strongly to the former. The age difference in trust was robust when we controlled for partner age and the ability to delay gratification. We further hypothesized that older children are more attuned to the probability of reciprocity. Indeed, older children were more sensitive to changes in the game's structure and the trustee's characteristics, suggesting that they are not only more trusting, but more discerning in their decisions of when to trust.

© 2013 Elsevier B.V. All rights reserved.

## 1. Introduction

One of the most important problems in social decision-making is knowing when to trust. Dilemmas of trust come in many forms, and they affect consumers, organizations, and close relationships (Rotter, 1970). Trusting someone requires the abilities to forego an immediate reward or payoff and to accurately predict how a stranger, the trustee, will react. Effectively managing trust requires complex cognitive skills, including perspective-taking (Davis, 1983) and the ability to delay gratification (Metcalf & Mischel, 1999). Researchers across the social sciences have identified trust as an important topic (Luhmann, 2000; Mayer, Davis, & Schoorman, 1995), but relatively little is known about its cognitive development. The present research addresses this issue by examining the social decision-making of children.

### 1.1. Trust

Most research on interpersonal trust has focused on adults (Evans & Krueger, 2009), but it is also important in the lives of children, who must decide how to spend their pocket money, whether to trade or lend toys, and choose which peers to

\* Corresponding author. Address: Department of Social Psychology, Tilburg University, P.O. Box 90153, 5000 LE Tilburg, The Netherlands. Tel.: +31 13 466 2408; fax: +31 13 466 2067.

E-mail address: [A.M.Evans@uvt.nl](mailto:A.M.Evans@uvt.nl) (A.M. Evans).

collaborate with in games and school projects (Webley, 2005). Across these contexts, trust is defined as the willingness to accept vulnerability based on a positive expectation of another person's behavior (Rousseau, Sitkin, Burt, & Camerer, 1998). An act of trust involves the consideration of potential outcomes, what may be gained or lost from trusting, and the estimation of the probability with which those outcomes will occur. That is, the trustor must predict whether the other person is trustworthy.

The economic trust game is a widely accepted tool for the measurement of trust (see Fig. 1a for an example). This game involves two individuals with distinctive roles. First, the trustor chooses between the *status quo* and trust. The choice of the *status quo* amounts to an act of distrust, and the interaction ends with the trustor receiving a modest, but guaranteed outcome. The alternative response, trust, can yield a better or a worse outcome than the *status quo*, its value depends on how the second party reacts. When trust occurs, the trustee has a choice between an equitable, mutually beneficial outcome (reciprocity) and an inequitable, personally advantageous outcome (betrayal). For the trustor, reciprocity is the best possible outcome, whereas betrayal is the worst. The dilemma is that a decision must be made without knowing the trustee's future response. There are legitimate reasons for the trustor to be skeptical of the trustee, whose best possible outcome is betrayal.

Not surprisingly, acts of trust are more common within positive interpersonal relationships (Glaeser, Laibson, Scheinkman, & Soutter, 2000) or when third-party information suggests that the other party is trustworthy (Bolton, Katok, & Ockenfels, 2004). However, even when these factors are absent—as they are when strangers interact—adults show moderate levels of trust (Berg, Dickhaut, & McCabe, 1995; Johnson & Mislin, 2011). It remains controversial whether this finding is evidence that people trust too much or too little. Normative game theory asserts that rational behavior is strictly self-interested, and that therefore any expectation of reciprocity is groundless (Binmore, 2007). From this perspective, any act of trust is irrational. By contrast, sociological norm theory (Cialdini, Reno, & Kallgren, 1990) asserts that many, if not most, people respect the norm of reciprocity and that trustors can anticipate this respect (Bicchieri, Xiao, & Muldoon, 2011). Comparing empirical data with maximum possible outcomes, some psychologists have argued that the irrationality lies in people not trusting enough (Evans & Krueger, 2011; Fetchenhauer & Dunning, 2010).

In the present paper, we investigate how children make decisions in anonymous dilemmas of trust. Our first hypothesis is that children are predominantly distrusting until they develop the cognitive skills necessary to find value in trust (Eisenberg, Fabes, & Spinrad, 2006). Specifically, we expect that trust depends on perspective-taking (Epley, Morewedge, & Keysar, 2004), abstract reasoning (Piaget, 1977/2001), and the ability to delay gratification (Metcalf & Mischel, 1999). We hypothesize that cognitive development generally improves the value of trust relative to the *status quo*, as the benefits of trust are uncertain, delayed, and contingent on the behavior of an unknown partner. Younger children, who prefer immediate rewards and lack the ability to predict the trustee's future response, prefer the *status quo*.

Two previous studies investigated the development of trust in children. Harbaugh, Krause, Liday, and Vesterlund (2003) compared economic trust across four age groups (ranging from 3rd to 12th graders). Overall, older age groups did not show higher levels of trust. As the experimenters noted, however, the complexity of the experimental design could have been responsible for these null results. Rather than playing a binary choice trust game, such as the one depicted in Fig. 1a, the children played an investment game that required them to decide how many tokens to invest. In addition to being easier for children to understand, the binary choice game also enables experimenters to manipulate structural aspects of trust, such as the trustee's temptation not to reciprocate.

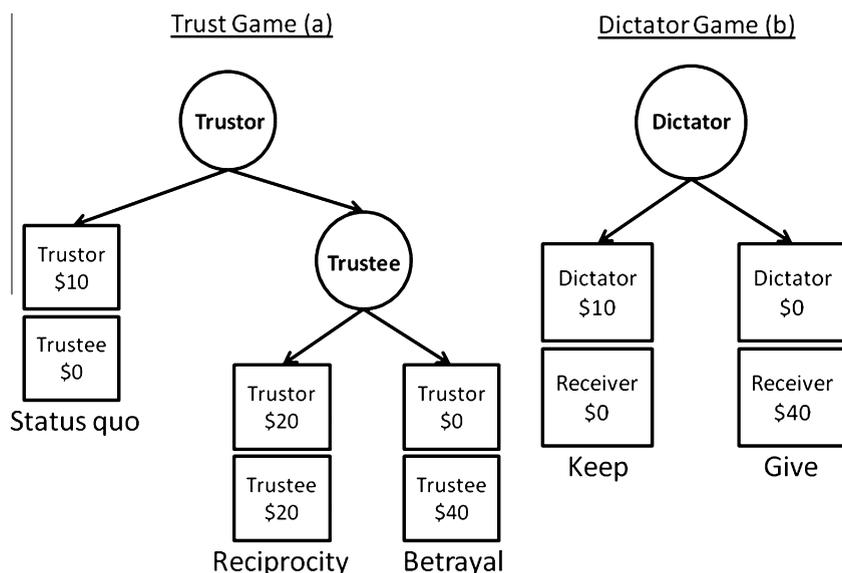


Fig. 1. The economic trust game (a) and the dictator game (b).

Sutter and Kocher (2007) conducted a study comparing 8-year-olds, adolescents, and adults, and found that the likelihood of trust increased from childhood to adulthood. In this study, the participants always interacted with a same-age partner, which makes it difficult to be sure whether the age difference signaled a developmental change in trust, or whether the trustors responded to an assumed increase in the trustworthiness of their partners. The latter possibility cannot yet be excluded because Harbaugh and colleagues reported that trust was greater when the trustee was older. To pursue the developmental hypothesis further, we begin by testing the basic finding that older children are more trusting, and then investigate whether the effects of age can be explained by the age of the trustee.

It is important to distinguish between trust as a mental state and trust as an economic behavior: Although we hypothesize that young children are generally distrusting in economic situations, they may have strong *feelings* of trust. The emotional state of trust is the willingness to accept information, making it instrumental in language and skill acquisition (Koenig & Harris, 2005). This capacity manifests itself in early infancy, and Erikson (1950) famously called trust “the first task of the ego” (p. 29). For infants and young children, trust may be a biologically prepared orientation, which only gradually yields to the ability to apply trust selectively. To capture this maturational process, Vanderbuilt, Lui, and Heyman (2005) observed how children of different ages interacted with adults who had previously proven to be either helpful or intentionally misleading. Three-year-olds trusted indiscriminately. At age five, however, children began to distrust the misleading adults. Yet, even many 5-year-olds erroneously trusted the unreliable adult, suggesting that their skills were not fully developed. In adults, the mental state of distrust not only depends on sophisticated cognitive processes, it also has surprising adaptive consequences. For example, priming distrust leads to enhanced creativity and improved problem solving (Mayer & Mussweiler, 2011; Schul, Mayo, & Burnstein, 2008).

Although there is a systematic relationship between feelings of trust and economic behavior (Huang & Murnighan, 2010), there is no one-to-one correspondence. Many factors beyond feelings of trust affect economic decisions, including incidental affect (Lount, 2010), group processes (Brewer, 2008), and social norms (Dunning, Fetchenhauer, & Schlösser, 2012). In fact, models assuming egocentrism suggest that feelings of trust are secondary to the calculation of costs and benefits. According to this view, trustors overemphasize information regarding their own potential outcomes, while neglecting the trustee's outcomes and hence the probability of seeing their own trust reciprocated (Evans & Krueger, 2011). Therefore, it is reasonable to expect that older children are more trusting in an economic game, even though they may be more inclined to have distrustful feelings. Evidence of a positive relationship between age and trust would further clarify the difference between trust as an economic behavior vs. trust as a mental state.

### 1.2. Altruism

To understand the development of trust, it is necessary to distinguish it from the parallel development of prosocial behavior, or actions taken with the primary intention to help or benefit others (Batson & Powell, 2003). If there are meaningful age differences in altruistic motivations, those differences are likely to have consequences for trust, as there is a structural relationship between acts of trust and altruism. In our example of the trust game (Fig. 1a), the combined payoffs for betrayal and reciprocity are greater than the combined payoffs for the *status quo*. The trustor may not personally benefit from trust, but there are guaranteed increases in social efficiency (the total wealth of both players) and the other player's wealth. Hence, an act of trust could be related to either self-interest, prosocial concern for the trustee, or a combination of the two.

One way of accounting for the role of altruism in trust is to measure behavior in a truncated trust game, where the second player has no opportunity to reciprocate (Fig. 1b). Such a situation amounts to a dictator game, where the trustor chooses between the *status quo* and the worst possible outcome of trust, namely “betrayal.” When trust games are yoked with comparable truncated games, rates of trust are higher than rates of selfless giving (Cox, 2004). That is not to say that prosocial motives are irrelevant. Among adults, concern for others' well-being predicts trust (Kanagaretnam, Mestelman, Nainar, & Shehata, 2009).

While there is mixed support for the hypothesis that trust increases with age, there are numerous findings linking cognitive development with altruism. Gummerum, Hanoch, Keller, Parsons, and Hummel (2010) found that older children (in a comparison of 3, 4, and 5-year-olds) were more willing to share stickers in a dictator game. Yet, altruism does not plateau at such an early age, it continues to develop throughout childhood: Kogut (2012) found that the willingness to share increased between the ages of 3 and 8, and Martinsson, Nordblom, Rützler, and Sutter (2011) found that sharing increased further between the ages of 10 and 15. Similarly, Fehr, Rützler, and Sutter (2011) found that from ages 8 to 17, children become less spiteful and more altruistic. Consistent with prior results, we hypothesize that older children behave more altruistically in a dictator game.

Our hypotheses thus far suggest that age is associated with greater altruism and trust. However, consistent with the view that altruism plays a secondary role in trust decisions (Cox, 2004), we also hypothesize that age has differential effects on the two types of decisions. We expect that the effects of age in trust go beyond changes in prosociality. The increasing tendency to trust reflects, at least in part, self-interested decision-making.

### 1.3. Trust and perspective-taking

We propose that the developmental trajectories of trust and altruism diverge because trust decisions are also motivated by self-interested, strategic perspective-taking (Galinsky, Maddux, Gilin, & White, 2008; Trötschel, Huffmeier, Loschelder,

Schwartz, & Gollwitzer, 2011). We posit that older children are more likely to trust because they are more focused on the trustee and the expected probability of reciprocity. In addition to anticipating an overall increase in trust, this hypothesis leads to the prediction that older children are more sensitive to variables that affect the probability of reciprocity. In other words, older children will be more trusting, and more discerning in when to trust.

As in the case of trust, reciprocity is most likely to occur when there is a preexisting relationship (Glaeser et al., 2000) or the possibility of future interactions (Dal Bó, 2005), but there is still a moderate level of reciprocity among strangers (Johnson & Mislin, 2011). In anonymous interactions, the best predictor of reciprocity is the trustee's temptation, that is, the extra money obtained from betrayal (Malhotra, 2004; Snijders & Keren, 1999). Demographic variables, such as gender and age, are also correlated with the trustee's decision (Croson & Gneezy, 2009; Sutter & Kocher, 2007). Women and older trustees are more likely to reciprocate. The ability to infer the probability of reciprocity from such situational and demographic cues requires a sophisticated theory of mind (Wellman, 2012). Our hypothesis is that older children are more sensitive to the factors that affect the probability of reciprocity, such as the trustee's temptation and age.

#### 1.4. Gender differences in economic behavior

An additional goal of our research was to test for gender differences in the economic behavior of children. In studies of adult decision-making, women tend to be less trusting but more prosocial than men (Croson & Gneezy, 2009). It is unknown, however, when these differences emerge. Identifying the point of origin in economic gender differences has important implications for education. For example, collaborative projects that require trust among peers could potentially favor male students.

Gender differences in trust demonstrate how trust as a feeling can be dissociated from trust as an economic behavior. Research on individual differences in personality has shown that women are more agreeable than men (Costa, Terracciano, & McCrae, 2001), which suggests that women are also more trusting, as trust is categorized as a facet of agreeableness. However, when economic behavior is studied, men tend to show higher levels of trust (for a review see Croson & Gneezy, 2009). Arguably, men are more trusting in economic situations because they are more willing to accept the risk of betrayal (Bohnet & Zeckhauser, 2004).

The pattern is reversed for altruism and trustworthiness (Croson & Gneezy, 2009). With respect to altruism, research shows that 3–5-year old girls are more willing to share stickers in a dictator game (Gummerum, Hanoch, Keller, Parsons, & Hummel, 2010). A motivational explanation is that women are generally less competitive than men (Gneezy & Rustichini, 2004). However, Dreber, von Essen, and Ranehill (2011) compared 7–10 years old children and found no gender differences in competitiveness across several tasks. Alternatively, girls may be socialized in accordance with gender roles that encourage relationship oriented behavior (Ruble, Martin, & Berenbaum, 2006).

#### 1.5. Overview

We report two cross-sectional experiments that examine the developmental trajectories of trust and prosocial behavior. Our primary hypotheses are that older children are more trusting and altruistic, but that age differences in altruism do not fully account for the effects of age on trust. In addition to studying whether children are more trusting overall, we also examine whether older children are more discerning when placing trust. We manipulated two cues related to the probability of reciprocity, with the hypothesis that older children are more sensitive to these cues. Finally, we examine the development of gender differences in decision-making.

## 2. Experiment 1

Our first experiment examined decision-making in games measuring trust and altruism, comparing the behavior of kindergarten (4–5 years old) and elementary school (9–10 years old) children. Previous studies of trust in children used 8-year-olds as the youngest reference group (Harbaugh et al., 2003; Sutter & Kocher, 2007). However, in distinguishing the parallel trajectories of trust and altruism, we considered kindergarteners to be a relevant comparison point, as kindergarteners have shown altruistic tendencies (Gummerum et al., 2010), but they are unlikely to possess the cognitive skills needed for a dilemma of trust. We hypothesized that older children are more trusting (Sutter & Kocher, 2007) and more altruistic (Fehr, Bernhard, & Rockenbach, 2008; Sutter, 2007). Critically, we predicted that a corresponding age difference in altruism cannot explain the effect of age on trust.

We also investigated the interaction between developmental changes and the structure of the trust game. We hypothesized that older children are not only more trusting, but also more discerning in when to trust. We therefore prepared two versions of the game: A standard, or “regular,” trust game and a “temptation” game, in which the trustee had a stronger financial incentive to betray the trustor. In anonymous interactions, the trustee's temptation to betray is associated with the probability of reciprocity (Snijders & Keren, 1999). If the development of trust depends on the maturation of certain cognitive skills, older children may realize that the probability of reciprocity is lower in the temptation game, making them less trusting than in the regular game. If, as we hypothesize, kindergarteners are yet to master perspective-taking, they will not discriminate between these two variants.

## 2.1. Method

### 2.1.1. Participants

One hundred and seventy-two children (82 boys and 89 girls) participated. Kindergarten children ( $n = 81$ ) were recruited in eight different educational settings in a midsized Austrian city, with ages ranging from 4 ( $n = 32$ ) to 5 ( $n = 49$ ) years. Elementary school children ( $n = 91$ ) were recruited from four public schools in the same area. Among the elementary school children, there were 24 nine-year-olds, 66 ten-year-olds, and 1 eleven-year-old. The parents of each child consented to participation.

### 2.1.2. Materials

Each child played three games with one of two female experimenters. Using a method developed by Moore (2009), the experimenter began by presenting the child with a photo of the other player (the trustee or recipient), who was of the same age and the same gender as the participant. The photos were selected from a set of 40 pre-tested images (10 girls and 10 boys of each age group). Ten adults rated the children on the photos for their attractiveness. We calculated mean scores for each picture within each gender and age group. The two pictures from each subgroup with the lowest variance were selected. Each child played the sequence of three games (regular, temptation, and altruism) with one of the two selected pictures. Table 1 summarizes the structure of each game.

**2.1.2.1. Regular trust game.** The “regular” trust game was selected as the benchmark for trusting behavior across both experiments. At the beginning of the regular game, the experimenter handed the participant a “surprise bag”. Each bag contained one of several possible toys, such as rubber balls, stickers, balloons, little stuffed animals, pencils, key rings, or painting chalks. The toys were concealed in paper so that they could not be identified.

After handing the bag to the child, the experimenter told her that she either could keep the bag or give it to the trustee. In the latter case, the trustee would receive four bags, instead of just one. Then, the trustee would decide either to keep all four bags, or to keep two and return the others to the trustor. Thus, a child who trusted could end up with either two bags or none at all. Children were told that the experimenter would meet the trustee within the next few days and would inform the participant of that child’s decision. After several days, the experimenter returned to the kindergarten or school. To conclude the interaction, she told each child that the trustee had reciprocated and returned two surprise bags (rather than keeping all four).

**2.1.2.2. Temptation game.** The temptation game had the same basic structure as the regular trust game. However, if the trustor gave away the surprise bag, then the trustee’s choices were to keep all four bags or to return three bags to the trustor (keeping only one bag for herself). In this case, there was a greater temptation not to return any surprise bags (Evans & Krueger, 2011; Malhotra, 2004; Snijders & Keren, 1999).

**2.1.2.3. Altruism game.** The altruism game also began with the delivery of a surprise bag. Children were told that they could give the bag to another child who would then receive a total of four bags (while the participant retained nothing), but who would have no opportunity to return anything. The altruism game is thus a truncated trust game, in which any potential future benefit to the trustor is removed (Cox, 2004).

### 2.1.3. Procedure

The experimenter escorted each child individually from the classroom to a separate quiet room. The experiment began with showing the child a basket containing the toys that could potentially be in one of the surprise bags. The experimenter asked the child if she liked the toys, and if she would like to receive them. Then, she asked a series of questions about the child’s siblings and birth-order. In addition, children indicated how many friends they had and, finally, the experimenter measured the child’s height. These variables were not analyzed in the present report.

After this procedure, the experimenter played the three games with the child. The altruism game was always played last and the order of the two trust games was randomized. Each game began with presenting the selected picture of the potential trustee or recipient. The other child was referred to as “a boy (or girl) the same age as you who attends a different school.” Each photograph was presented next to a small basket, and the child was told that after playing the game, the basket would

**Table 1**  
Summary of economic games in Experiment 1.

	Keep	Give away
Altruism game	Participant gets one bag, other child gets nothing	Participant gets nothing; other child gets four bags
Temptation game	Participant gets one bag, other child gets nothing	Other child receives four bags. The other child can keep all four, or keep one and return three
Regular game	Participant gets one bag, other child gets nothing	Other child receives four bags. The other child can keep all four, or keep two and return two

be delivered to the child in the picture. Before asking for a decision, the experimenter made sure that the child understood the rules of the game. After all decisions were recorded, the experimenter asked the child if she had liked the trustee (responses were coded as positive, neutral, or negative), and she invited them to explain their judgments. Finally, the experimenter asked if they believed that the other player, if trusted, would return any surprise bags.

## 2.2. Results

### 2.2.1. Procedural variables and manipulation checks

We tested for possible effects of game order (i.e., was the temptation game presented before or after the regular game?), experimenter (there were two female experimenters), and the picture of the other player used for the three games (two variants for each subgroup), but found none.

Participants in both groups reported that they wanted the surprise bags that were used as currency (97% liking within each age group). Most children in both age groups also said they liked the toys (98.1% of kindergarteners and 94.5% of elementary schoolers). Those who did not like the toys were neutral towards them. The difference between groups in liking was not significant, Fisher's exact  $p = .23$ .

Each child rated whether she liked, was neutral to, or disliked the partner's photo. Among children in the elementary school, 92% liked the partner, while the remaining 8% were neutral. In contrast, 75% of the kindergarten children liked the partner, 10% were neutral, and 15% disliked the partner. These distributions of responses were significantly different from each other,  $\chi^2(2) = 15.2, p = .001$ . We therefore included partner liking as a factor in the following analyses. The variable was collapsed into two categories (0 = neutral towards or dislikes partner; 1 = likes partner).

### 2.2.2. Basic findings

The overall rates of trust were intermediate in the regular (55%) and the temptation games (51%), but higher than the rate of giving in the altruism game (23%),  $p$ 's < .001. Fig. 2 illustrates the effects of age group on the trust and the altruism games. Elementary school children were more trusting than kindergarteners in the regular (79.1 vs. 27.1%) and the temptation games (72.5 vs. 27.1%),  $p$ 's < .001. Older children were also more altruistic than kindergarteners (27.4 vs. 17.2%), but not significantly so,  $\chi^2(1) = 2.5, p = .11$ .

### 2.2.3. Trust differences across age groups

Our first test of age differences in trust investigated behavior in the regular game by using age group, liking, and altruism (behavior in the altruism game) as predictors in a logistic regression model. Overall, the model fit the data significantly better than chance,  $\chi^2(3) = 53, p < .001$ . Controlling for the effects of liking and altruism, elementary school children were 9.04 times more likely to trust (compared to kindergarten children):  $b = 2.20, SE = .37, \chi^2(1) = 36.4, p < .001$ . Not surprisingly, liking was marginally associated with trust. Children who liked their partner were 2.7 times more likely to trust them:  $b = 1.01, SE = .54, \chi^2(1) = 3.51, p = .061$ . Importantly, altruism did not predict trust,  $b = .15, SE = .45, p = .74$ .

This pattern of results was replicated in the temptation game. The full model fit the data better than chance,  $\chi^2(3) = 44, p < .001$ . Confirming the main result, elementary school children were 6.1 times more likely to trust,  $b = 1.81, SE = .35, \chi^2(1) = 26.6, p < .001$ . Liking was also associated with higher levels of trust; children who liked their partners were 4.04 times

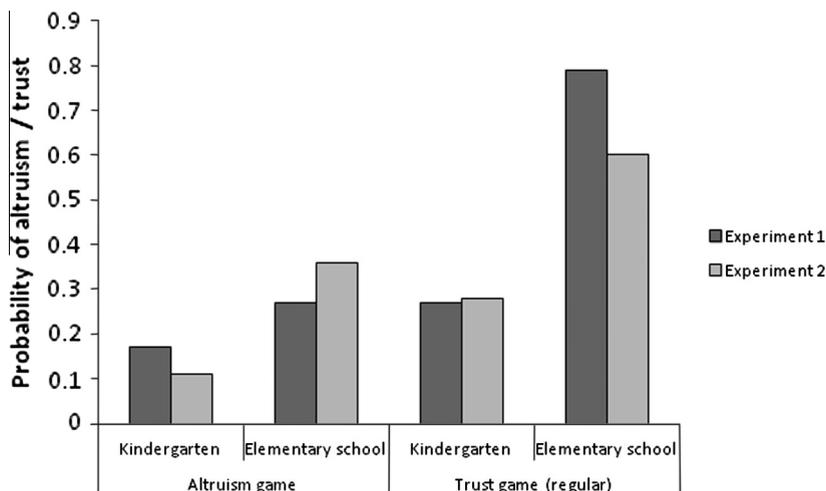


Fig. 2. Rates of trust (regular game) and altruism across age groups.

more likely to trust them,  $b = 1.39$ ,  $SE = .56$ ,  $\chi^2(1) = 6.08$ ,  $p = .014$ . Altruism, however, did not predict trust,  $b = .19$ ,  $SE = .42$ ,  $p = .64$ .

**2.2.3.1. Comparing the regular and temptation games.** Next, we asked whether the two age groups differentiated between the regular and temptation games. As expected, the kindergarteners did not ( $z = 0$ ,  $p = 1$ ; by Wilcoxon test). Unexpectedly, however, rates of trust among elementary school children did not significantly differ in the two games, although the difference was in the predicted direction ( $z = 1.09$ ,  $p = .27$ ).

**2.2.3.2. Explanations for behavior.** After making decisions in the trust games, children were also asked to explain their decisions to the experimenter. Based on the hypothesized development of perspective-taking, we thought that elementary school children would offer fewer egocentric explanations (references to self-interested motives) and be more likely to refer to the characteristics of the trustee (statements about the trustee's traits, or references to trusting the partner).

In the regular trust game, kindergarteners were more likely than elementary school children to refer to egocentric motives for their decisions (46.9% vs. 20%,  $z = 3.6$ ,  $p = .002$ ); and elementary school children were marginally more likely to refer to the trustee in their explanations (18.4% vs. 9.8%,  $z = 1.60$ ,  $p = .10$ ). Results were similar when we examined reasons for behavior in the temptation game. Fig. 3 shows the frequencies of egocentric and trustee-relevant explanations by age groups.

#### 2.2.4. Trust differences within age groups

We also tested for developmental changes in trust that occurred within the age groups, comparing the decisions of 4- and 5-years-old kindergarteners, and comparing 9 year old elementary school children with 10- and 11-year-olds (ages 10 and 11 were combined into one group as there was only one 11-year-old).

**2.2.4.1. Kindergarteners.** In the regular game, rates of trust were comparable for 4- and 5-year-olds (24.2% and 29.2%, respectively),  $\chi^2(1) = .24$ . Similarly, there was no meaningful difference in the temptation game (21.2% among 4-year-olds; 31.2% among 5-year-olds),  $\chi^2(1) = .99$ .

**2.2.4.2. Elementary school children.** As with the kindergarteners, we detected no age differences in the regular trust game (75% among 9-year-olds; 80.5% among 10- and 11-year-olds),  $\chi^2(1) = .33$ . Yet, critical to the hypothesis that perspective-taking skills develop with age, older elementary school children were *less* likely to trust in the temptation game (87.5% trust among 9-year-olds; 67.5% among 10- and 11-year-olds),  $\chi^2(1) = 3.66$ ,  $p = .055$ . Fig. 4 illustrates the changes in trust observed across and within age groups. As expected, older children were more sensitive to the trustee's temptation, though the effect was only evident when differences within age groups were considered.

#### 2.2.5. Age and altruism

We also predicted that altruism would increase with age. To test the effects of age on altruism, we estimated a logistic regression with behavior in the altruism game as the dependent variable (0 keep; 1 = gave away). Age group (0 = kindergarten; 1 = elementary school) and liking (0 = neutral or dislikes; 1 = likes) were entered into the model as predictors. Overall, the model fit the data significantly better than chance,  $\chi^2(2) = 6.51$ ,  $p = .039$ . Liking was marginally associated with higher levels of altruism:  $b = 1.31$ ,  $SE = .76$ ,  $\chi^2(1) = 2.92$ ,  $p = .086$ . Children who liked their partner were 3.74 times more likely to give away their toy to help the recipient. Age group, however, was not significantly associated with altruism. Older children

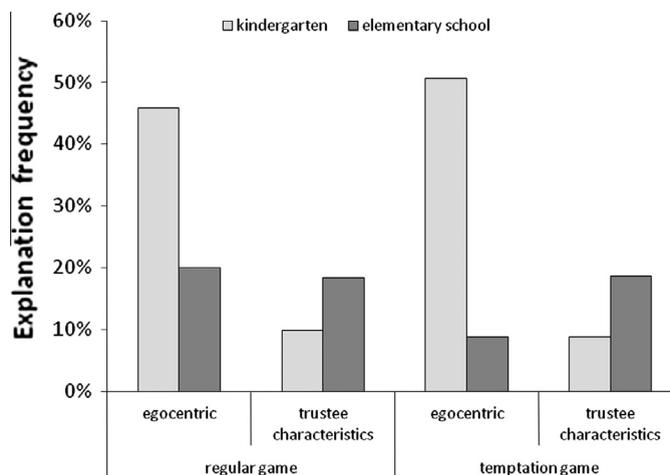


Fig. 3. Explanations of behavior in the regular and temptation games.

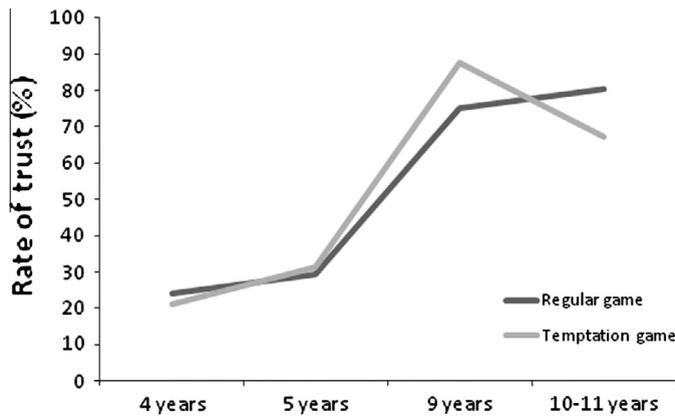


Fig. 4. The effects of age (within and across groups) on trust in the regular and temptation games.

were only 1.55 times more likely to give away the toys,  $b = .44$ ,  $SE = .38$ ,  $\chi^2(1) = 1.31$ ,  $p = .25$ . We also examined the relationship between altruism and age group without controlling for liking. Yet, this analysis did not change the conclusions,  $b = .59$ ,  $SE = .38$ ,  $\chi^2(1) = 2.50$ ,  $p = .11$ .

We considered the possibility that acts of altruism were strategically self-interested. Since each child played the sequence of games with the same partner, it is possible that some gave away their toys in the altruism game in the hopes of encouraging reciprocity in the trust games. However, we found no difference in the rates of altruism when we compared children who trusted in the regular game (26.6%) and those who did not (17.9%),  $\chi^2(1) = 1.8$ ,  $p = .18$ .

Finally, we looked for effects of gender (separate or interactive with age group), but found none (see Table 2 for the rates of trust and altruism by gender).

### 2.3. Discussion

Experiment 1 showed a positive effect of age on trust. Controlling for responses in the altruism game did not alter this result. The conceptual and behavioral sovereignty of trust was important to show because the trust game confounds trust with altruism. Some individuals may turn their resources over to a trustee even though they have no expectation of reciprocity; rather, they expect to be betrayed (Cox, 2004). According to this perspective, the difference between the rate of trust and the rate of altruism can represent what might be called “true trust.” Without controlling for altruism, self-interest and altruism have additive effects on trust. Since we found, however, that trust was independent of altruism over individuals, we propose that such a difference underestimates the self-interested component of trust.

Although we predicted that trust would increase with age, we did not expect older children to trust indiscriminately. There was indeed evidence for the development of perspective-taking skills. Recall that trust can be decomposed into two major elements: the evaluation of one’s own outcomes and the expected probability that an act of trust will be reciprocated. This expectation is not a piece of information available as part of the instructions; a trustor must appraise the trustee’s potential payoffs and translate them into a behavioral prediction. Arguably, this prediction requires cognitive sophistication. In Experiment 1, only the decisions of older elementary school children (10–11 years old) were sensitive to the difference between the regular and temptation games.

The analysis of qualitative data further supported the hypothesis that trust increases with age due to the development of cognitive perspective-taking. We examined age differences in the relative frequencies of egocentric and trustee-relevant explanations for behavior. Elementary school children were less likely than kindergarteners to provide egocentric explanations of their decisions (referring to self-interested motives), and were more likely to refer to the traits or characteristics of the trustee.

Table 2

Gender differences in altruism and trust (regular game).

	N		Altruism		Trust (regular)	
	Boys	Girls	Boys	Girls	Boys	Girls
Experiment 1	82	89	.27	.19	.49	.60
Experiment 2	95	93	<b>.17</b>	<b>.27</b>	<b>.35</b>	<b>.49*</b>

Gender comparisons were made within each experiment using Chi-square tests. Bold indicates  $p < .10$ .

\* Indicates  $p < .05$ .

Although trust increased substantially with age, there was less evidence for a similar increase in altruism. Older children liked their partners more, and liking was a significant predictor of altruistic behavior, but they were not more likely to give up a surprise bag in the altruism game. Perhaps an aversion to inequality overshadowed any altruistic tendencies among older children (Fehr et al., 2008). Note that in our altruism game, the generous response was to keep nothing for the self, while the other party received four toys.

A potential concern with these findings was that participants always played the altruism game after they played the trust games. This order ensured that there would be no any spill-over from altruism (or lack thereof) to trust (or lack thereof). However, it was possible that trust contaminated the measure of altruism. To address this concern, we did a follow-up experiment in which we varied the order of the altruism game and the regular trust game. One hundred sixty-three Austrian children (83 kindergarteners and 80 elementary schoolers) participated. The materials and procedure were similar to Experiment 1, except that the order of the regular game and the altruism game was randomized, the temptation game was excluded, and the trustee's gender was manipulated as a between-subjects factor. Reassuringly, the order of the games made no difference,  $\chi^2$ 's < 1. Furthermore, the basic effects of age replicated the result of Experiment 1. Older children were more altruistic (18% vs. 6%,  $p = .013$ ) and more trusting (47.8% vs. 26.5%,  $p < .001$ ) than kindergarteners.

### 3. Experiment 2

In Experiment 1, children interacted with a partner belonging to the same age group. With this aspect of the design we accepted a confound (as did Sutter & Kocher, 2007) such that the observed increase in trust could be credited to the older age of the trustee, as older children tend to be more benevolent. Perhaps older children were more willing to trust because their partners (also older children) were more likely to reciprocate (Buccioli & Piovesan, 2011; Martinson et al., 2011). Conversely, the lack of trust among kindergarteners may reflect an awareness or an assumption that their peers are untrustworthy. With the first experiment's limited evidence for perspective-taking among kindergarteners and the egocentrism found among adult trustors (Evans & Krueger, 2011), we doubted this interpretation but considered a direct empirical test was necessary.

We designed Experiment 2 to remove any potential effect of partner age. Children in both age groups were randomly assigned to interact with either a kindergarten- or elementary school-aged trustee. Our main hypothesis was that an age-of-trustor effect emerges independently of any potential trustee effect. Yet, we also thought that older children might be more sensitive to the age of the trustee. That is, they would be less likely to trust a younger child. In contrast, we saw no reason to think that kindergarteners discriminate between young and old trustees.

In Experiment 1, children who trusted had to wait several days before learning the outcomes of their decisions. It is therefore possible that age differences in the ability to delay gratification accounted for the age effect on trust, as the decision to trust was also a choice between a small, immediate reward and a potentially larger, but delayed one (Metcalfe & Mischel, 1999). In Experiment 2, we addressed this issue by observing behavior in a trust game, in which the trustor *immediately* learned the other player's response and received the corresponding reward. We compared the results in an immediate trust game with the results in a replication of the "regular" game used in Experiment 1. This comparison allowed us to test whether delay of gratification was the primary factor inhibiting trust among kindergarteners. We hypothesized that although the ability to delay gratification may play some role in the development of trust, it is only one of several necessary cognitive skills.

#### 3.1. Method

##### 3.1.1. Participants

A total of 188 children participated. Kindergarten age children ( $n = 104$ ) were recruited from seven different schools around a midsize city in Austria. The 84 elementary school children (42 boys and 42 girls) were recruited from five different schools in the same area. Ages within each group were comparable to those reported in Experiment 1.

##### 3.1.2. Materials

**3.1.2.1. The trust games.** Each child played two trust games, one of which was identical to the *regular trust game* used in Experiment 1. Children who trusted had to wait until the end of the day to learn the other player's response. In the *immediate trust game*, the children saw the trustee's photo on a computer screen (as opposed to a piece of paper). They were told that this trustee was connected over the internet, and that they would learn his or her response immediately, removing the element of delay. The potential payoffs of the immediate game were identical to those in the regular game. The children played the games with two different trustees of the same gender as the participant. The pictures of the trustees were the same as those used in Experiment 1. The order of the regular and immediate trust games was randomized.

**3.1.2.2. The altruism game.** After completing the two trust games, children played the altruism game. The child could keep one bag for him or herself, or give four bags to the recipient. The recipient was always the trustee from the delayed, regular game.

### 3.1.3. Procedure

As before, the experimenters ran the study in a quiet room with one child at a time. The experimenter began by showing the prizes and asking a series of questions: if the child liked the toys and if they would like to have them, the child's age, and how many friends and siblings the child had.

Next, the experimenter played the three games with the child. To ensure that each child understood the rules, she asked the child to repeat them. Before each game, the children were told the trustee's age. Half of the participants were randomly assigned to play the games with elementary school children, whereas the other half played with kindergarten children. Each child played with two different partners, but the age of the other players remained consistent for each participant. When playing with the kindergarten trustees, the experimenter said that "this child goes to kindergarten and, thus, has the same age as (is younger than) you." For the elementary school trustee she said: "This child goes to elementary school and, thus, has the same age as (is older than) you."

After the three games, the children indicated whether they liked the children on the pictures (like/do not know/do not like). The children could take all "earned" bags with them. At the end of the school day, all children who had trusted in the regular (delayed) trust game received two additional bags.

## 3.2. Results

### 3.2.1. Procedural variables and manipulation checks

We began by investigating whether the procedural variables (game order and experimenter) influenced behavior in any of the three games (the altruism game, the regular trust game, and the immediate trust game). Neither variable influenced behavior in any of the games.

We also compared how the two age groups responded to the surprise bags and photos of the other players. All but one (i.e., 187) indicated that they liked the toys, and every child indicated that she wanted the toys. Each child provided ratings of two pictures of kindergarten or elementary school children (the age of the other players was consistent for each child). We examined whether participant age affected ratings of either picture group. There were three possible responses (like, neutral, do not like) that were collapsed into two categories (like and neutral/do not like).

Fifty-one kindergarten and 40 elementary school children rated the two kindergarten pictures. Kindergarteners were marginally more likely (74%) than elementary school children (57%) to like the first picture (74%)  $\chi^2(1) = 2.9, p = .087$ . Liking of the second picture was comparable in the two groups (68% and 57% respectively for kindergarten and elementary school children),  $\chi^2(1) = 1.2$ . The remaining 97 participants rated the two elementary-school-aged pictures. There were no significant age differences in ratings of these two pictures,  $\chi^2's < 1$ . Given the limited age differences, we excluded partner liking from the following analyses, but we note that adding liking as a predictor did not change the results.

Finally, we tested whether order of participation influenced children's decisions. Recall that children completed the experiment one at a time, raising the possibility that later participants had advance knowledge of the experiment (e.g., that trust in the immediate game always lead to reciprocity). We conducted logistic regressions on each of the three games with order of participation as a covariate. As the number of children recruited at each location substantially differed for kindergarteners and elementary schoolers, we conducted separate analyses for each age group.

For kindergarteners, order of participation did not influence altruism decisions,  $b = -.047, SE = .067, \chi^2(1) = .48, p = .95$ ; nor did it influence trust in the delayed game,  $b = .013, SE = .044, \chi^2(1) = .088, p = .76$ . In the immediate trust game, later kindergarten participants were somewhat more likely to trust, though the effect was not significant,  $b = .063, SE = .041, \chi^2(1) = 2.3, p = .13$ . For older children, late participants were not more altruistic  $b = .009, SE = .030, \chi^2(1) = .08, p = .77$ ; they were, however, slightly (but not significantly) more trusting in the delayed game,  $b = .051, SE = .032, \chi^2(1) = 2.6, p = .11$ . Later participants also tended to trust more often in the immediate game,  $b = .067, SE = .042, \chi^2(1) = 2.4, p = .12$ . Given these trends, we asked whether adding the order of participation as a covariate would alter the effect of age group on trust, but it did not.

### 3.2.2. Basic findings

As expected, trust in the regular (delayed) game (42%) was less common than trust in the immediate game (53%),  $Z = 2.79, p = .001$ , but even in the delayed game, trust was more common than altruism (22%),  $Z = 4.82, p < .001$ . Age group had an effect in both the delayed (59.5% vs. 27.7% respectively for elementary school and kindergarten children) and the immediate game (78.5% vs. 32.7%). In this experiment, age was also associated with greater altruism 35.7% vs. 10.6%; all  $p's < .001$ .

### 3.2.3. Trust differences across age groups

We examined the effects of participant age group and recipient age (both coded such that 0 = kindergarten; 1 = elementary school) on trust. Participant age, recipient age, the participant's choice in the altruism game, and a term for the interaction of participant and recipient age were entered as predictors in a logistic model. The model fit the data better than chance;  $\chi^2(4) = 29.4, p < .001$ . Older children were 2.8 times more likely to trust than younger children,  $b = 1.04, SE = .47, \chi^2(1) = 4.8, p < .03$ . In contrast, the partner's age was not related to trust, nor did we find that it moderated the effect of participant age,  $\chi^2's < 1$ . Altruism was related to trust in this experiment, such that children who gave away their toys in the altruism game were 3.4 times more likely to trust,  $b = 1.22, SE = .41, \chi^2(1) = 9.1, p = .002$ . There were no other higher-order interactions among the predictors,

The results were similar in the immediate trust game. The trustor's age group and altruism predicted trust, and there were no other notable effects. This finding casts doubt on the hypothesis that a greater ability to delay gratification among older children's can explain the age effect in the regular trust game. Directly comparing rates of trust in the two games, we found that kindergarteners showed comparably low levels in the immediate (33%) and the regular (28%) games,  $z = 1.04$ ,  $p = .23$ , whereas elementary school children were more trusting in the immediate (79%) than in the delayed game (60%),  $z = 2.59$ ,  $p = .009$ . Contrary to the delay-of-gratification hypothesis, this pattern suggests that the regular trust game, compared with the immediate game, provides a stronger test of the age effect.

### 3.2.4. Trust differences within age groups

Following the approach employed in Experiment 1, we also tested for behavioral differences within age groups. Our hypothesis regarding the development of perspective-taking suggested that older children are more sensitive to the trustee's identity. We report the effects of participant and partner and age on behavior in the regular game, but note that patterns were similar with the immediate trust game.

Kindergarteners were categorized into two age groups: 4-year-olds ( $n = 38$ ) and 5- to 7-year-olds ( $n = 66$ , ages 5–7 were combined as there were relatively few 6- and 7-year-olds). Elementary school children were also separated into two groups: 8- and 9-year-olds ( $n = 41$ ; there were three 8-year-olds) and 10- to 11-year-olds ( $n = 43$ ; there was one 11-year-old).

**3.2.4.1. Kindergarteners.** A logistic regression was conducted with trust in the regular (delayed) game as the dependent variable. Trustor age (4 years = 0; 5–7 years = 1), trustee age, and an interaction term were entered as predictors. There were no statistically significant effects.

**3.2.4.2. Elementary school children.** A logistic regression was conducted with trust in the regular game as the dependent variable. Trustor age (8–9 years = 0; 10–11 years = 1), trustee age, and an interaction term were entered as predictors. Older elementary school children were marginally (2.9 times) more likely to trust,  $b = 1.09$ ,  $SE = .70$ ,  $p = .12$ . Partner age also had a marginal effect on trust,  $b = 1.18$ ,  $SE = .70$ ,  $p = .09$ , trust was 2.98 times more likely to occur when the partner was elementary-school aged. There was also a significant trustor age by partner age interaction,  $b = -2.04$ ,  $SE = .99$ ,  $p = .038$ .

To better understand this interaction, we examined the simple effects of partner age on younger (8- and 9-year-olds) and older (10- and 11-year-olds) elementary school children. Younger elementary school children were more likely to trust when the trustee belonged to the same age group (48% trust with a kindergarten-aged trustee vs. 75% trust with an elementary school trustee,  $p = .08$ ). However, partner age had no significant effect on older elementary school children (73% trust with a kindergarten trustee vs. 57% with an elementary school trustee,  $p = .20$ ).

### 3.2.5. Age and altruism

Turning to the data obtained with the altruism game, we examined the effects of participant age, recipient age, and their interaction,  $\chi^2(3) = 20.0$ ,  $p < .001$ . Participant age predicted altruistic behavior,  $\chi^2(1) = 11.1$ ,  $p = .001$ . Compared with kindergarteners, elementary school children were 9.6 times more likely to give away their surprise bag. The age of the recipient did not affect the likelihood of giving behavior,  $\chi^2(1) = 2.1$ ,  $p = .14$ ; nor did we find an interaction between participant age and recipient age,  $\chi^2(1) = 2.0$ ,  $p = .16$ .

### 3.2.6. Gender

We explored the effects of gender on behavior in the three games (Table 2 reports the effects of gender in the regular and altruism games). Our models also included age group and a gender by age group interaction terms. Gender did not influence altruism ( $\chi^2 = 1.1$ ,  $p = .31$ ) or trust in the regular games ( $\chi^2 < 1$ ). In the immediate trust game, however, there was a main effect of gender,  $b = 1.14$ ,  $SE = .44$ ,  $\chi^2 = 6.74$ ,  $p = .009$ , and an interaction with age group,  $b = -2.0$ ,  $SE = .71$ ,  $\chi^2 = 8.07$ ,  $p = .005$ . Among kindergarteners, girls trusted more often (45%) than boys (21%); among older children, boys were more trusting (86%) than girls (71%).

## 3.3. Discussion

Experiment 2 replicated the critical age effect on trust and resolved two ambiguities. First, there was the question of whether the age of the trustee was critical for an increase in trust. The other question was whether an increased ability to delay gratification facilitates greater trust in older children. Neither of these alternative explanations was supported. Greater trust was uniquely associated with the age of the trustor, and playing a game with immediate payoffs, instead of delayed ones, did not eliminate the age effect.

Unexpectedly, older children were *more* sensitive to the element of delay than kindergarteners. This result suggests that the ability to delay gratification was not the critical factor inhibiting trust among kindergarteners. Instead, the results speak to our hypothesis that older children are more selective in when they trust, while younger children appear to be unconditionally distrustful. Indeed, only elementary school children distinguished between the immediate and delayed games.

Examining the effects of partner age partially supported the prediction that older children are more discerning in their decisions to trust. Overall, kindergarteners did not alter their trust decisions based on the trustee's age. Younger elementary school children (ages 8–9), in contrast, were sensitive to this feature. They were more willing to trust when their partner was

the same age (as opposed to a kindergartener). Yet this pattern did not hold true for older elementary school children (10- and 11-year-olds). This result could be related to changes in participants' expectations of the trustees; perhaps the older children were more cynical about the trustworthiness of their peer group, or they became more optimistic about the likelihood of kindergarteners reciprocating.

Some results differed from those reported in Experiment 1. For example, we found that age was positively related to altruism. In our first experiment, there was no such effect, although the data pointed in this direction. The immediate game, in which children who trusted received the outcome (reciprocity) instantly, possibly contributed to this age difference. Compared with kindergarteners, older children were significantly more likely to trust in the immediate game. This is important, as those who trusted in the immediate game instantly received a reward based on the other player's decision. Critically, the immediate game always preceded the altruism game. Hence, older children, on average, had more guaranteed wealth than comparable children in Experiment 1, and had more reason to have positive feelings towards their interaction partners, though they interacted with distinct partners in the immediate and altruism games.

Experiment 2 also revealed some age-dependent effects of gender on trust (in the immediate, but not the regular trust game). Kindergarten-aged girls were more likely to trust than boys, and this pattern reversed among elementary school children. This finding conflicted with Experiment 1, where no effects of gender were found.

#### 4. General discussion

In two cross-sectional experiments, we explored developmental changes in trust and altruism. We found that both increase with age, but trust more so than altruism. Characteristics of the trustee (age and likability), the payoffs available to the trustee (temptation), or temporal differences in the delivery of the payoffs could not explain this basic age effect. Most importantly, the increase in trust could not be explained (away) by the increase in altruism.

Building upon previous developmental research (Harbaugh et al., 2003; Sutter & Kocher, 2007), the present work is the first to investigate the link between altruism and trust in children. In economic situations, trust and altruism are often correlated, making it plausible that age increases in trust are mediated by changes in altruism. Indeed, our results show that trust decisions are somewhat related to the trustor's prosocial tendencies. Experiment 2 found that altruism was associated with higher levels of trust, and the results of Experiment 1 pointed in the same direction, though they did not reach significance. However, we did not find that altruism fully accounted for the older children's greater willingness to trust, nor did we find that altruism moderated the effects of age on trust. We suggest that trust and altruism follow different developmental trajectories. Altruism towards an identified recipient is a basic sympathetic response that does not require much deliberation (Small, Loewenstein, & Slovic, 2007). Trust, in contrast, raises complex issues related to self-interest. Unlike the altruist, the trustor must assess the opportunities and constraints of the trustee's role.

Consistent with this interpretation, older children were more discerning in how they applied trust. In the trust game, the trustee's temptation is a cue to the probability of betrayal (Snijders & Keren, 1999). In Experiment 1, only older elementary school children (10–11 years old) were sensitive to the importance of temptation. Moreover, when providing explanations for their decisions, elementary school children were more likely than kindergarteners to refer to the trustee and less likely to refer to egocentric motives. Older children were also more sensitive to the self-relevant benefits of trust: In Experiment 2, elementary school children trusted more often in a game with immediate payoff delivery compared to a game with delayed outcomes. This difference can be normatively defended on the grounds that future rewards should be discounted. Kindergarteners, in contrast, did not respond with higher trust in the immediate game.

In addition to manipulating structural aspects of the trust game, we also investigated whether trustors were sensitive to relevant information about the trustee. In Experiment 2, we manipulated partner age to determine if children would identify kindergarten aged partners as less trustworthy. The results partially supported our hypothesis that older children engage in greater perspective-taking. Consistent with findings from Experiment 1, kindergarteners did not differentiate between the two partner types. Younger elementary school children (8- and 9-year-olds) were more likely to trust an older partner, but this effect did not appear within older children (10- and 11-year-olds).

In considering the inconsistent effects of trustee age on elementary school children, we noticed that older children were (of course) more likely to have a younger sibling: 41% of the 8- and 9-year-olds stated that they had a younger sibling, compared with 60% of the 10- and 11-year-olds,  $\chi^2(1) = 3.03, p = .08$ . Having frequent experience with a younger sibling may increase the willingness to trust a younger partner.

Taken together, the findings support the hypothesis of an age-related increase in the ability to take another person's perspective and the ability to use the resulting insights for behavioral prediction. However, it remains possible that processes beyond those examined in this research may account for the age effect. Compared with kindergarteners, older children are presumably more aware of the norm of reciprocity (Krueger, Massey, & DiDonato, 2008). Whereas the decisions of younger children may be driven by a simple sympathetic response (or lack thereof), older children appreciate their interaction partners as members of a social group. They may understand that this membership comes with obligations, in this case, the obligation to return a favor and to be fair (Gouldner, 1960).

Trust is essential for the creation of wealth in the group and the larger economy, but it is also critical for the regulation of one's personal welfare (Kohn, 2009). Our results suggest that decision-makers, even at a very young age, distinguish between acts of altruism and trust. Consistent with research on adult decision-making (Cox, 2004), we also find that self-interest is

the primary motive in children's trust decisions (Evans & Krueger, 2011; Malhotra, 2004). An interesting question for future research is whether appeals to self-interest or altruism are more effective in encouraging an initial act of trust (and whether the effectiveness of such appeals depends on the trustor's age).

An additional goal of our research was to test whether the children show the gender differences observed in adults. In economic contexts, men tend to be more trusting and less trustworthy than women (Croson & Gneezy, 2009). However, there was limited evidence of gender differences in either age group. We noted one statistically significant difference in behavior: in Experiment 2, kindergarten-aged girls were more trusting than boys, a difference that was in the opposite direction of previous findings (Croson & Gneezy, 2009). It seems doubtful that gender differences in economic behavior emerge before adolescence. Identifying the developmental point of origin for gender differences remains an important goal for future research.

Many important social decisions involve elements of interpersonal trust. Humans are not inherently prone to either trust or mistrust; rather, they must learn to navigate challenging interpersonal dilemmas during childhood and into adolescence (Sutter & Kocher, 2007). In these experiments older children were more trusting and more selective in applying trust, but we cannot conclude they were more accurate without investigating the corresponding behavior of trustees. Future research must consider the correspondence between trustors' decisions and trustees' responses.

## Acknowledgements

We thank Nastassja Danner, Hannah Ertl, Ute Hofer, Marlies Platzer, Petra Strobl, and Katrin Urtschnig for their help with data collection.

## References

- Batson, C. D., & Powell, A. A. (2003). Altruism and prosocial behavior. In T. Millon & M. J. Lerner (Eds.), *Handbook of psychology. Personality and social psychology* (Vol. 5, pp. 463–484). Hoboken, NJ: Wiley.
- Berg, J., Dickhaut, J., & McCabe, K. (1995). Trust, reciprocity, and social-history. *Games and Economic Behavior*, 10, 122–142. <http://dx.doi.org/10.1006/game.1995.1027>.
- Bicchieri, C., Xiao, E., & Muldoon, R. (2011). Trustworthiness is a social norm, but trusting is not. *Politics, Philosophy & Economics*, 10, 170–187. <http://dx.doi.org/10.1177/1470594X10387260>.
- Binmore, K. (2007). *Game theory: A very short introduction*. Oxford, UK: Oxford University Press.
- Bó, P. D. (2005). Cooperation under the shadow of the future: Experimental evidence from infinitely repeated games. *The American Economic Review*, 95, 1591–1604.
- Bohnet, I., & Zeckhauser, R. (2004). Trust, risk and betrayal. *Journal of Economic Behavior in Organizations*, 55, 467–484. <http://dx.doi.org/10.1016/j.jebo.2003.11.004>.
- Bolton, G. E., Katok, E., & Ockenfels, A. (2004). How effective are electronic reputation mechanisms? An experimental investigation. *Management Science*, 50, 1587–1602. <http://dx.doi.org/10.1287/mnsc.1030.0199>.
- Brewer, M. B. (2008). Depersonalized trust and ingroup cooperation. In J. I. Krueger (Ed.), *Rationality and Social Responsibility: Essays in Honor of Robyn Mason Dawes* (pp. 215–232). New York, NY: Taylor & Francis Psychology Press.
- Buccioli, A., & Piovesan, M. (2011). Luck or cheating? A field experiment on honesty with children. *Journal of Economic Psychology*, 32, 73–78. <http://dx.doi.org/10.1016/j.joep.2010.12.001>.
- Cialdini, R. B., Reno, R. R., & Kallgren, C. A. (1990). A focus theory of normative conduct: Recycling the concept of norms to reduce littering in public places. *Journal of Personality and Social Psychology*, 58, 1015–1026. <http://dx.doi.org/10.1037//0022-3514.58.6.1015>.
- Costa, P. T., Terracciano, A., & McCrae, R. R. (2001). Gender differences in personality traits across cultures: Robust and surprising findings. *Journal of Personality and Social Psychology*, 81, 322–331. <http://dx.doi.org/10.1037//0022-3514.81.2.322>.
- Cox, J. C. (2004). How to identify trust and reciprocity. *Games and Economic Behavior*, 46, 260–281. [http://dx.doi.org/10.1016/S0899-8256\(03\)00119-2](http://dx.doi.org/10.1016/S0899-8256(03)00119-2).
- Croson, R., & Gneezy, U. (2009). Gender differences in preferences. *Journal of Economic Literature*, 47, 448–474. <http://dx.doi.org/10.1257/jel.47.2.448>.
- Davis, M. H. (1983). Measuring individual differences in empathy: Evidence for a multidimensional approach. *Journal of Personality and Social Psychology*, 44, 113–126. <http://dx.doi.org/10.1037//0022-3514.44.1.113>.
- Dreber, A., von Essen, E., & Ranehill, E. (2011). Outrunning the gender gap—Boys and girls compete equally. *Experimental Economics*, 14, 567–582.
- Dunning, D., Fetchenhauer, D., & Schlösser, T. M. (2011). Trust as a social and emotional act: Noneconomic considerations in trust behavior. *Journal of Economic Psychology*.
- Eisenberg, N., Fabes, R. A., & Spinrad, T. L. (2006). Prosocial development. In N. Eisenberg, W. Damon, & R. M. Lerner (Eds.), *Handbook of child psychology. Social, emotional, and personality development* (6th ed., Vol. 3, pp. 646–718). Hoboken, NJ: Wiley.
- Epley, N., Morewedge, C. K., & Keysar, B. (2004). Perspective taking in children and adults: Equivalent egocentrism but differential correction. *Journal of Experimental Social Psychology*, 40, 760–768. <http://dx.doi.org/10.1016/j.jesp.2004.02.002>.
- Erikson, E. (1950). *Childhood and society*. New York, NY: Norton & Company, Inc..
- Evans, A. M., & Krueger, J. I. (2009). The psychology (and economics) of trust. *Social and Personality Psychology Compass*, 3, 1003–1017. <http://dx.doi.org/10.1111/j.1751-9004.2009.00232.x>.
- Evans, A. M., & Krueger, J. I. (2011). Elements of trust: Risk and perspective-taking. *Journal of Experimental Social Psychology*, 47, 171–177. <http://dx.doi.org/10.1016/j.jesp.2010.08.007>.
- Fehr, E., Bernhard, H., & Rockenbach, B. (2008). Egalitarianism in young children. *Nature*, 454, 1079–1083. <http://dx.doi.org/10.1038/nature07155>.
- Fetchenhauer, D., & Dunning, D. (2010). Why so cynical? Asymmetric feedback underlies misguided skepticism in the trustworthiness of others. *Psychological Science*, 21, 189–193. <http://dx.doi.org/10.1177/0956797609358586>.
- Galinsky, A. D., Maddux, W. W., Gilin, D., & White, J. B. (2008). Why It Pays to Get Inside the Head of Your Opponent The Differential Effects of Perspective Taking and Empathy in Negotiations. *Psychological Science*, 19(4), 378–384.
- Glaeser, E. L., Laibson, D. I., Scheinkman, J. A., & Soutter, C. L. (2000). Measuring trust. *Quarterly Journal of Economics*, 115, 811–846. <http://dx.doi.org/10.1162/003355300554926>.
- Gneezy, U., & Rustichini, A. (2004). Gender and competition at a young age. *American Economic Review Papers and Proceedings*, 94, 377–381. <http://dx.doi.org/10.1257/0002828041301821>.
- Gouldner, A. (1960). The norm of reciprocity. *American Sociological Review*, 25, 161–179.
- Gummerum, M., Hanoch, Y., Keller, M., Parsons, K., & Hummel, A. (2010). Preschoolers' allocations in the dictator game: The role of moral emotions. *Journal of Economic Psychology*, 31, 25–34. <http://dx.doi.org/10.1016/j.joep.2009.09.002>.

- Harbaugh, W. T., Krause, K., Liday, S. G., Jr., & Vesterlund, L. (2003). Trust in children. In E. Ostrom & J. Walker (Eds.), *Trust, reciprocity and gains from association: Interdisciplinary lessons from experimental research* (pp. 143–154). New York: Russell Sage Foundation.
- Huang, L., & Murnighan, J. K. (2010). What's in a name? Subliminally activating trusting behavior. *Organizational Behavior and Human Decision Processes*, 111, 62–70. <http://dx.doi.org/10.1016/j.obhdp.2009.10.002>.
- Johnson, N. D., & Mislin, A. A. (2011). Trust games: A meta-analysis. *Journal of Economic Psychology*, 32, 865–889. <http://dx.doi.org/10.1016/j.joep.2011.05.007>.
- Kanagaretnam, K., Mestelman, S., Nainar, K., & Shehata, M. (2009). The impact of social value orientation and risk attitudes on trust and reciprocity. *Journal of Economic Psychology*, 30(3), 368–380. <http://dx.doi.org/10.1016/j.joep.2008.12.003>.
- Koenig, M. A., & Harris, P. L. (2005). The role of social cognition in early trust. *Trends in Cognitive Science*, 9, 457–459. <http://dx.doi.org/10.1016/j.tics.2005.08.006>.
- Kogut, T. (2012). Knowing what I should, doing what I want: From selfishness to inequity aversion in young children's sharing behavior. *Journal of Economic Psychology*, 33, 226–236. <http://dx.doi.org/10.1016/j.joep.2011.10.003>.
- Kohn, M. (2009). *Trust: Self-interest and the common good*. Oxford, UK: Oxford University Press.
- Krueger, J. I., Massey, A. L., & DiDonato, T. E. (2008). A matter of trust: From social preferences to the strategic adherence of social norms. *Negotiation & Conflict Management Research*, 1, 31–52. <http://dx.doi.org/10.1111/j.1750-4716.2007.00003.x>.
- Lount, R. B. (2010). The impact of positive mood on trust in interpersonal and intergroup interactions. *Journal of personality and social psychology*, 98(3), 420.
- Luhmann, N. (2000). Familiarity, confidence, trust: Problems and alternatives. In D. Gambietta (Ed.), *Trust: Making and breaking cooperative relations* (pp. 94–107). Oxford, UK: Oxford University Press.
- Malhotra, D. (2004). Trust and reciprocity decisions: The differing perspectives of trustors and trusted parties. *Organizational Behavior and Human Decision Processes*, 94, 61–73. <http://dx.doi.org/10.1016/j.obhdp.2004.03.001>.
- Martinsson, P., Nordblom, K., Rützler, D., & Sutter, M. (2011). Social preferences during childhood and the role of gender and age—An experiment in Austria and Sweden. *Economics Letters*, 110, 248–251.
- Mayer, R. C., Davis, J. H., & Schoorman, F. D. (1995). An integrative model of organizational trust. *The Academy of Management Review*, 20, 709–734. <http://dx.doi.org/10.5465/AMR.1995.9508080335>.
- Mayer, J., & Mussweiler, T. (2011). Suspicious spirits, flexible minds: When distrust enhances creativity. *Journal of Personality and Social Psychology*, 101, 1262–1277. <http://dx.doi.org/10.1037/a0024407>.
- Metcalfe, J., & Mischel, W. (1999). A hot/cool system analysis of delay of gratification: Dynamics of willpower. *Psychological Review*, 106, 3–19. <http://dx.doi.org/10.1037/0033-295X.106.1.3>.
- Moore, C. (2009). Fairness in children's resource allocation depends on the recipient. *Psychological Science*, 20(8), 944–948.
- Piaget, J. (1977/2001). *Studies in reflecting abstraction*. Sussex, UK: Psychology Press.
- Rotter, J. B. (1970). Generalized expectancies for interpersonal trust. *American Psychologist*, 26, 443–452. <http://dx.doi.org/10.2466/pr0.1970.26.2.517>.
- Rousseau, D. M., Sitkin, S. B., Burt, R. S., & Camerer, C. (1998). Not so different after all: A cross-discipline view of trust. *Academy of Management Review*, 23, 393–404. <http://dx.doi.org/10.5465/AMR.1998.926617>.
- Ruble, D. N., Martin, C. L., & Berenbaum, S. A. (2006). Gender development. In N. Eisenberg, W. Damon, & R. M. Lerner (Eds.), *Handbook of child psychology. Social, emotional, and personality development* (6th ed., Vol. 3, pp. 858–932). Hoboken, NJ: Wiley.
- Schul, Y., Mayo, R., & Burnstein, E. (2008). Encoding under trust and distrust: The spontaneous activation of incongruent cognitions. *Journal of Personality and Social Psychology*, 86, 668–679. <http://dx.doi.org/10.1016/j.jesp.2008.05.003>.
- Small, D. A., Loewenstein, G., & Slovic, P. (2007). Sympathy and callousness: The impact of deliberative thought on donations to identifiable and statistical victims. *Organizational Behavior and Human Decision Processes*, 102(2), 143–153.
- Snijders, C., & Keren, G. (1999). Determinants of trust. In David, V. Budescu, Ido, Erev, & Rami, Zwick (Eds.), *Games and human behavior* (pp. 355–385). Mahwah, NJ: Lawrence Erlbaum.
- Sutter, M. (2007). Outcomes versus intentions. On the nature of fair behavior and its development with age. *Journal of Economic Psychology*, 28, 69–78. <http://dx.doi.org/10.1016/j.joep.2006.09.001>.
- Sutter, M., & Kocher, M. (2007). Trust and trustworthiness across different age groups. *Games and Economic Behavior*, 59, 364–382. <http://dx.doi.org/10.1016/j.geb.2006.07.006>.
- Trötschel, R., Hüffmeier, J., Loschelder, D. D., Schwartz, K., & Gollwitzer, P. M. (2011). Perspective taking as a means to overcome motivational barriers in negotiations: when putting oneself into the opponent's shoes helps to walk toward agreements. *Journal of personality and social psychology*, 101(4), 771.
- Vanderbilt, K. E., Lui, D., & Heyman, G. D. (2005). The development of distrust. *Child Development*, 82, 1372–1380.
- Webley, P. (2005). Children's understanding of economics. In M. Barrett & E. Buchanan-Barrow (Eds.), *Children's understanding of society* (pp. 43–67). Hove, UK: Psychology Press.
- Wellman, H. M. (2012). Theory of mind: Better methods, clearer findings, more development. *European Journal of Developmental Psychology*, 9, 313–330.