

## Children's altruistic behavior in the dictator game

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### Abstract

This study examined developmental and socioeconomic status (SES) differences in young children's altruistic behavior in the dictator game (DG). Children aged 4, 6, and 9 years old from six British primary schools played the DG with genetically unrelated individuals using stickers as resource. Results demonstrated that older children and children from higher SES environments behaved more altruistically, although the majority of children displayed altruistic behavior even at the youngest age level. Results buttress conclusions based on studies from diverse cultures and from brain imaging research by providing additional evidence for the fundamental nature of altruistic behavior, as well as for the probable influence of local socialization practices on development.

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### 1. Introduction

Virtually all developmental studies conclude that young children behave selfishly towards genetically unrelated individuals (for reviews, see [Damon, 1977](#); [Eisenberg & Fabes, 1998](#)). A few studies report the development of altruistic behavior during middle childhood (ages 6–12 years), but evidence remains inconclusive due to discrepancies obtained in relation to variations in methods and populations ([Eisenberg & Fabes, 1998](#)). Simple economic games, such as the dictator game (DG), provide an avenue for systematically examining altruistic behavior even in young children.

Compared to all other species, human beings display much higher levels of altruistic behavior towards genetically unrelated individuals (for a review, see [Haviland, Prins, Walrath, & McBride, 2004](#)). Individuals display altruistic behavior towards nonkin across diverse societies ranging from small subsistence communities containing familiar individuals to large market-based societies with anonymous exchanges ([Henrich et al., 2005](#)). Whereas altruism between kin can be explained in terms of genetic benefits ([Hamilton,](#)

[1964](#)), the mechanisms underlying cooperation or altruism between genetically unrelated individuals remain obscure. Examining the extent to which humans attain their own individual goals while simultaneously displaying altruistic behavior towards unrelated individuals constitutes a powerful lens with which to illuminate knowledge of human social interactions.

Over the past decade, there has been remarkable progress in developing methods for isolating variables that influence human social interaction. Contrary to prior emphasis on the overwhelming importance of self-interest in interactions with nonkin, newer research highlights the critical importance of a number of unselfish behaviors (for reviews, see [Camerer, 2003](#); [Roth, 1995](#)). Research from diverse cultures demonstrates that social norms for conditional altruism exist (e.g., [Axelrod, 1984](#)). Individuals who obey social norms for altruistic behavior obtain rewards, whereas those who defy norms incur punishment even at a cost to those inflicting the punishment (for a review, see [Fehr & Fischbacher, 2004](#)). Although large absolute differences in norms for altruistic behavior occur across cultures, all cultures appear to reward altruistic behavior and to punish selfishness to some extent ([Henrich et al., 2005, 2006](#)). Furthermore, recent neural ([Fehr & Rockenbach, 2004](#)) and hormonal ([Kosfeld, Heinrichs, Zak, Fischbacher, & Fehr, 2005](#)) studies suggest an evolved basis for the maintenance of altruistic norms.

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Much of the research documenting the ubiquitous nature of norms for altruistic behavior rests on the development of simple economic games that permit the isolation of specific social behaviors (for reviews, see [Camerer, 2003](#); [Roth, 1995](#)). Although these games elicit criticism (as lacking in ecological validity, hence constituting imperfect predictors of actual social behavior), the strength of these games lies in their ability to isolate and test simple predictions without naturally occurring confounds that obfuscate the influence of any one variable. Furthermore, field evidence of naturally occurring altruistic behavior both provides ecological validity for and permits modification of the parameters of the games so that they more closely mimic elements of natural interactions ([Falk & Fehr, 2003](#)).

Games vary in the ability of other players to reciprocate, the number of players, the number of iterations, the ability of outside observers to reward and punish selfish behavior, payoffs from cooperation versus defection, and the reputation of other players (for a review, see [Fehr & Fischbacher, 2003](#)). They also differ in terms of stable individual differences of players, such as their age, sex, and culture ([Henrich et al., 2005](#)). The creation of positive-versus-negative feedback conditions simulating specific market conditions permits researchers to examine increasingly realistic and complex economic decisions ([Camerer & Fehr, 2006](#)).

While recent research on the display of altruistic behavior investigates its biological basis (e.g., [Fehr & Rockenbach, 2004](#); [Kosfeld et al., 2005](#)), as well as its pervasiveness and variability across diverse cultures ([Henrich et al., 2005](#)), the development of altruistic behavior in children remains virtually unexplored. A number of researchers consequently have concluded that research into the development of altruistic behavior in children would aid in illuminating the nature of altruism ([Fehr & Fischbacher, 2003, 2004](#); [Henrich et al., 2005](#)).

Only a few developmental studies have utilized paradigms in which children must distribute resources. In a study by [Harbaugh, Krause, and Liday \(2003\)](#), 7-, 9-, 10-, 14-, and 18-year-olds played the DG, as well as other economic games. In the DG, each participant was given 10 tokens (each of which, they were told, was worth about \$0.25) and asked to divide them between the participant and another anonymous classmate. At the end of the study, older participants exchanged the tokens for money, and younger ones exchanged the tokens for toys or school supplies. Envelopes were used to ensure the confidentiality of proposers' choices and to avoid responses designed to please adults. Results showed that dictator proposals increased with age. Based on the figures provided, average dictator proposals were approximately 0.5 tokens for 7-year-olds, 1.70 tokens for 9-year-olds, and almost 4 tokens for 18-year-olds. Girls also behaved slightly more altruistically than boys. Researchers utilizing other methods have similarly reported small developmental increases in altruistic behavior in Western societies in contexts in which

children must specifically distribute resources, but the results are mixed (for reviews, see [Eisenberg & Fabes, 1998](#); [Murnighan & Saxon, 1998](#)).

These same studies also report a slight tendency for girls to behave more prosocially than boys in public situations ([Eisenberg & Fabes, 1998](#)). With the exception of the [Harbaugh et al. \(2003\)](#) study, however, researchers have not utilized the DG. Results from economic games with adults yield inconsistent sex differences, with females behaving more altruistically in some studies (e.g., [Eckel & Grossman, 1998, 2001](#)) but not in others (e.g., [Gurven, 2004](#); [Henrich et al., 2005](#)). Field studies of adults in Western societies however, show that men, more than women, demonstrate prosocial behavior towards genetically unrelated individuals (for a review, see [Eagly & Crowley, 1986](#)).

Finally, [Henrich et al. \(2005\)](#) conclude from their study of economic games across 15 small-scale societies that the degree of market integration exerts the strongest influence on altruistic behavior towards nonkin. In societies in which all transactions occur with familiar individuals over short expanses of time, the requirement for altruistic behavior towards anonymous individuals remains minimal. The opposite holds true in societies that are reliant on large market-based economies. Thus, [Henrich et al.](#) infer that adults in societies that vary in their degree of market integration likely socialize their children to display differing levels of altruistic behavior towards anonymous others. Studies comparing children in impoverished versus more advantaged subcultures in Western societies demonstrate that children from impoverished subcultures are less likely to trust others or to expect others to reciprocate altruistic behavior (for an extensive review, see [Evans, 2004](#)). Likewise other studies have demonstrated a link between the way adults earn a living and their child-rearing values in industrial ([Kohn, 1990](#)) and small-scale societies ([Barry, Child, & Bacon, 1959](#)).

The strengths of the DG rest on its uniform procedure, simplicity, and wide application, which permit systematic comparisons of altruistic behavior across diverse individuals and contexts. In the DG, one individual (the proposer) dictates how much the other individual (the recipient) will gain (for detailed descriptions, see [Kagel & Roth, 1995](#)). Unlike other games, the recipient does not have the power to reject the offer. The key components of the DG consist of a one-shot allocation of a valued resource from one proposer to one recipient, both of whom are anonymous to each other and to others. For convenience, resources generally are divided into discrete parts, such as 10 units, which then can be divided between the two players. DGs vary in the degree to which the researcher is aware of the proposer's allocation, the recipient, and whether a rationale is provided for sharing (e.g., [Hill & Gurven, 2004](#)). Most DGs have been played with university students who typically allocate, on average, 20–30% of their resources to the recipient (e.g., [Forsythe, Horowitz, Savin, & Sefton, 1994](#)). Of all the economic games developed to date,

only the DG is simple enough to represent a valid measure of altruistic behavior in young children.

Based on prior findings using economic games with adults and based on the research by Harbaugh et al. (2003), this study was designed to examine developmental, socio-economic, and gender effects on children's altruistic behavior in the DG. Pilot testing demonstrated that the youngest age at which children could understand the rules of the game was 4 years. Efforts to use more complex economic games, such as ultimatum or public goods games, with this age group failed due to the inability of young children to comprehend other players' perspectives (for a review, see Wellman, Cross, & Watson, 2001).

Four-year-old, 6-year-old, and 9-year-old children were included to examine as early as possible altruistic behavior and developmental changes during early and middle childhood years. Because formal schooling commences in England at the age of 4 years, schools provide an obvious venue for examining altruistic behavior towards genetically unrelated yet familiar others. The specific variables of interest were: the age during which children would exhibit altruistic behavior, whether this would depend on the context in which they were raised [lower or higher socioeconomic status (SES)], and whether sex differences in altruistic behavior occur in young children. Children in schools where most parents live in government-provided council housing because they cannot afford their own homes were defined as coming from lower SES environments. Children who attend schools where most parents own their own homes were defined as coming from higher SES environments. Parents who cannot afford their own homes likely participate less in wage labor and other anonymous delayed exchanges and, therefore, likely socialize their children differently than parents of children who participate in the labor market (Barry et al., 1959; Henrich et al., 2005; Kohn, 1990).

For the resource, a large variety of highly attractive stickers were used. Stickers were selected because they are highly valued by children of these ages and are used by teachers in all participating schools to reward outstanding behavior. All stickers were purchased outside the country to enhance their value by ensuring that no child had previously obtained an identical one. Although it is possible that children from lower SES environments with fewer resources valued the stickers more (e.g., Bruner & Goodman, 1947), this is unlikely because children in all six schools received stickers for superior performance. Thus, stickers did not represent a scarcer resource for children from lower SES environments versus children from higher SES environments.

## 2. Method

### 2.1. Participants

Children from six classes each at the 4-, 6-, and 9-year-old grade levels in four low SES primary schools situated

next to public housing and children from four classes each at the 4-, 6-, and 9-year-old grade levels in two higher SES primary schools served as proposers. The SES of the school is defined in England by the number of children receiving free lunches. In lower SES schools, >50% of children in each school received free lunches. In higher SES schools, <5% of children in each school received free lunches. Although ethical considerations prohibited collection of individual socioeconomic information, the general environments inhabited by children who attended lower SES schools versus children who attended higher SES schools differed markedly.

In total, 360 children participated as proposers, with 30 boys and 30 girls at each grade level within each level of SES. All schools were located in the southwest of England. More than 98% of the children were White and born in England, reflecting the demographics of the region.

Consent forms were distributed to all parents. If fewer than half of the children in a class were given consent to participate, all of these children were included in the study. When more than half received parental consent, children were randomly selected for inclusion. No more than 50% of the students in any one class were included. More classes from lower SES schools were included because fewer children returned parental consent forms compared to those in higher SES schools. Class sizes, however, were identical in both schools, ranging from 28 to 32 students per class. This ensured that, in each class, all children were aware that a substantial percentage of the class did not receive any stickers.

### 2.2. Procedure

Because research with young children requires sensitivity to their special needs, particularly their reluctance to engage in unfamiliar interactions with strangers, extensive pilot testing was conducted in schools not involved in the actual study. Modifications enacted to the procedure after pilot testing ensured that the procedures were easily comprehensible to the youngest children. Two women with many years of experience working with children served as interviewers. Each woman interviewed half of the boys and half of the girls at each grade level within each level of SES. Using random assignment, half of the children of each sex and each age were asked whether they wished to donate their stickers to boys, and half were asked whether they wished to donate their stickers to girls. Thus, within each sex, half of the children were asked to donate to same-sex peers, and half of the children were asked to donate to other-sex peers.

Every child was brought individually to an empty room or hallway by an interviewer. The child and the interviewer sat across from each other at a child-sized table. To begin, the interviewer introduced herself, asked the child's name, and informed the child that she had some stickers for the child. The interviewer then emptied one bag of 30 highly attractive stickers in front of the child so that all stickers

were displayed face up in front of the child. The interviewer next asked the child to select the 10 stickers that the child liked most. As demonstrated in pilot testing, children of all ages treasured the stickers and selected their stickers with great care. Following their selection, the interviewer asked the child “Do you like your stickers?” All children affirmed forcefully that they liked their stickers.

Once a child had chosen the stickers, the child then was told that the stickers now belonged to him/her but that the child might like to give some stickers to a girl/boy in the class because the interviewer would not have time to give stickers to all children in the class. The interviewer emphasized that the child did not have to give away any stickers and could keep all of them. The child further was informed that neither the child nor the interviewer would know who received the child’s stickers. Instead, another interviewer would distribute the stickers to those children who were not interviewed.

The interviewer then went to great lengths to ensure that the child understood that the child’s decision was completely anonymous. The child was informed that if the child wanted to donate some stickers to another girl/boy in the class, then the child should place the stickers in a white envelope and place the white envelope in a large pile of identical white envelopes. The child should place the stickers that the child wanted to keep for the self in the brown envelope marked with the child’s name. The interviewer further explained to the child that she would close her eyes and cover them with her hands so she would never know what the child decided to do. The interviewer also emphasized that she would never know what the child decided because she could not look inside the envelopes. Finally, the interviewer asked the child if the child understood the instructions. If the child did not, the interviewer repeated them until the child indicated comprehension.

Standardized instructions were as follows: “Here are a bunch of stickers. Choose 10 that you like a lot. OK, now I only have time to give stickers to some of the girls/boys in your class, but not to all the girls/boys. If you want to, you can give some of your stickers to a girl/boy in this class whom I do not give stickers to. You do not have to give any of your stickers away, but if you want to, you could give some to a girl/boy. I do not know which girl/boy will get them, and you will not know. Another lady will decide who gets them later.”

She continued “It is important that you understand that you do not have to give any of your stickers away, that you will not know who gets them, and that I will not know if you decide to give any of your stickers away. If you want to give any of these stickers away to another girl/boy in this class, then put the stickers you want to give away in this white envelope. I will close my eyes and cover them beforehand, and you put the stickers you want to keep in this brown envelope with your name on it, and the stickers you want to give away in the white envelope. Then put the white

envelope in with all these other white envelopes. OK, are you ready?”

Once the child understood the instructions, the interviewer reminded the child which stickers went in the white and brown envelopes, closed her eyes, covered them, and turned away from the table. After approximately 2 min, she asked the child if the child had finished. Once the child responded affirmatively, the interviewer then thanked the child for helping her and told the child to take the brown envelope and return to the classroom. For ethical reasons, so that children who did not have the opportunity to participate in the study would not feel neglected, after the entire study had been completed, the interviewers returned to each school and distributed nine stickers to each child who did not participate in those classes where the study was conducted. Although this involved a small amount of deception towards participating children, the cost of the deception appeared small relative to the benefits of ensuring that all children obtained stickers.

### 3. Results

An analysis of variance (ANOVA) performed on the number of stickers donated to classmates, with age level, SES, sex of proposer, and sex of recipient as independent variables, yielded significant effects of Age Level [ $F(2, 336)=3.02, p=.05$ ], SES [ $F(1, 336)=7.33, p<.007$ ], and Age Level $\times$ Sex of Proposer $\times$ Sex of Recipient [ $F(2, 336)=3.95, p<.02$ ]. None of the other effects was significant [SES $\times$ Sex of Recipient,  $F(1, 336)=2.74, ns$ ; Sex of Recipient,  $F(1, 336)=2.57, ns$ ; Age Level $\times$ Sex of Recipient,  $F(1, 336)=1.46, ns$ ; Age Level $\times$ SES,  $F(1, 336)=1.43, ns$ ; all other effects,  $F_s<1$ ]. Where appropriate, Tukey’s tests ( $p<.05$ ) were conducted to examine differences between means. A Tukey’s test performed on the Age Level $\times$ Sex of Proposer $\times$ Sex of Recipient interaction was not significant, leaving only the effects of age level and SES.

Results demonstrated that while even the youngest children behaved altruistically, children’s altruistic behavior nevertheless increased with age level. Follow-up tests determined that 9-year-old children donated significantly more stickers to their classmates than did 4-year-old children. Six-year-old children donated an intermediate number that did not differ from the number donated by either 4-year-old or 9-year-old children (Fig. 1). Furthermore, children from higher SES environments donated significantly more stickers to their classmates than did children from lower SES environments. As displayed in the figure, the differences between children from differing SES environments became increasingly large with age level. The interaction between age level and SES was not significant, however, due to 12 children who donated extremely high numbers of stickers.

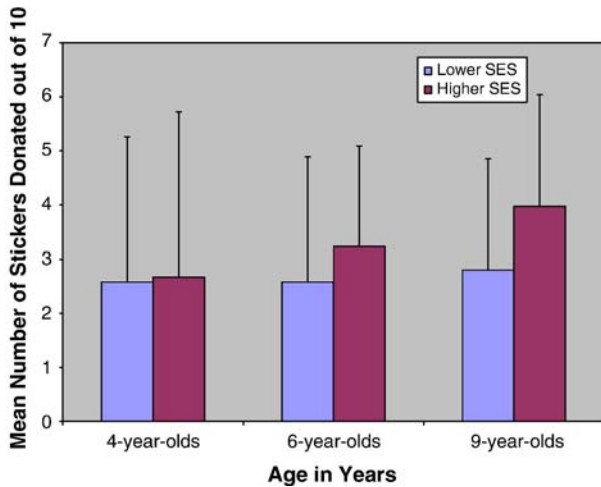


Fig. 1. The mean number (and standard deviation) of stickers donated to another classmate, by age level and SES, for the complete sample.

Repeat of the prior ANOVA excluding the 12 children who donated 8–10 stickers (4-year-olds, three from lower SES and five from higher SES; 6-year-olds, two from lower SES and none from higher SES; and 9-year-olds, one from lower SES and one from higher SES), yielded significant effects for Age Level [ $F(2, 324)=9.08, p<.001$ ], SES [ $F(1, 336)=8.70, p=.003$ ], and Age Level $\times$ SES Interaction [ $F(2, 324)=3.41, p<.04$ ]. None of the other effects was significant [Sex of Participant $\times$ Sex of Recipient:  $F(1, 324)=3.16, p<.10$ ; Sex of Recipient,  $F(1, 324)=2.57, p<.10$ ; Age Level $\times$ Sex of Participant $\times$ Sex of Recipient,  $F(2, 324)=2.49, p<.10$ ; SES $\times$ Sex of Recipient,  $F(1, 324)=2.22, ns$ ; Age Level $\times$ Sex of Participant,  $F(1, 324)=1.88, ns$ ; Age Level $\times$ SES $\times$ Sex of Participant,  $F(1, 324)=1.28, ns$ ; all other effects,  $F_s<1$ ].

Follow-up tests on the Age Level $\times$ SES interaction demonstrated that the effect of age level was significant only for higher SES children: 9-year-old children donated significantly more than did 4-year-old children, with neither age group differing significantly from 6-year-old children. In contrast to children from higher SES environments, children from lower SES environments did not donate significantly more stickers with increasing age. Consequently, follow-up tests demonstrated that, by the age of 9 years but not before, children from higher SES environments donated significantly more stickers than did children from lower SES environments.

Closer inspection of the standard deviations presented in Fig. 1 for the complete sample revealed that, with increasing age level, variance in donations declined. An  $F$  test for a comparison of standard deviations demonstrated that the standard deviation was significantly smaller for 6-year-old children than for 4-year-old children ( $F=1.84, p=.001$ ). Children therefore converge in the number of stickers they are willing to donate, which may be due to the decline of extreme donations with increasing age level.

To examine whether the number of children who donated extreme numbers of stickers declined with increasing age, chi-square analyses were performed. Both the number of children who donated between 8 and 10 stickers and the number of children who did not donate any stickers were compared for each age and SES level. While the number of stickers donated ranged from 0 to 10 at every age level, the number of children who donated 8–10 stickers declined significantly with increasing age [ $\chi^2(2)=6.21, p<.05$ ]. Further examination, however, showed that the difference was significant only for the children from higher SES environments due to the greater number of 4-year-old children who donated large numbers of stickers. Five 4-year-olds, no 6-year-old, and one 9-year-old from higher SES environments donated 8–10 stickers [ $\chi^2(2)=7.24, p<.03$ ]. In contrast, three 4-year-olds, two 6-year-olds, and one 9-year-old from lower SES environments donated 8–10 stickers [ $\chi^2(2)=1.03, ns$ ].

More informative was the significant decline with increasing age in the number of children who donated nothing to their classmates [ $\chi^2(2)=21.97, p<.001$ ]. Fig. 2 displays the results. Closer examination of the number of children who did not donate any stickers within each level of SES, however, demonstrated that age effect attained significance only for children from higher SES environments [ $\chi^2(2)=20.89, p<.001$ ], although the effect was marginally significant for children from lower SES environments [ $\chi^2(2)=4.92, p<.10$ ]. Because the number of children who donated nothing declined more precipitously for children from higher SES environments, by 9 years, significantly more children from higher than lower SES environments donated at least one sticker to an anonymous classmate [ $\chi^2(1)=4.18, p<.05$ ]. This suggests that children from higher SES environments increasingly learn social norms that prescribe directing altruistic behavior to anonymous others.

Fig. 3 displays the cumulative number of stickers donated, by age and socioeconomic level. As the figure

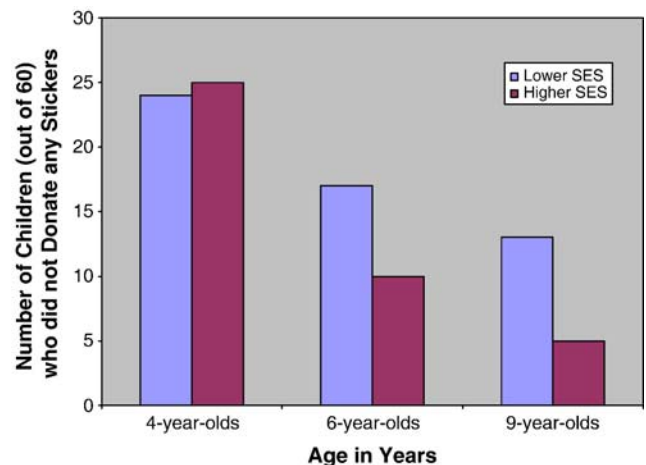


Fig. 2. Number of children who did not donate any stickers, by age level and SES.

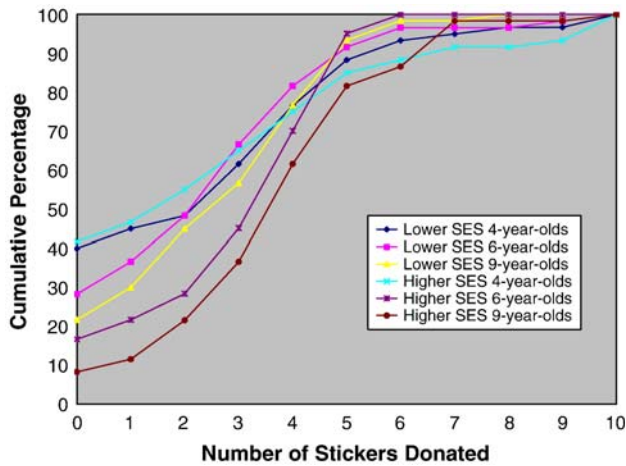


Fig. 3. Cumulative distribution of number of stickers donated, by age level and SES.

shows, 9-year-old children from higher SES environments were least likely to donate small numbers of stickers, followed by 6-year-old children from higher SES children. Two stickers constituted the median percentile donation for all children, with the exception of the 6-year-old and 9-year-old higher SES children whose median percentile donation ranged from three to four stickers. Few children in any group donated more than five stickers.

#### 4. Discussion

Developmental findings from the present study indicate that, even by 4 years of age, a majority of children from both lower and higher socioeconomic environments behave altruistically by donating at least one sticker to an anonymous classmate. This indicates an early basis for altruistic behavior. With increasing age, children behave more altruistically, particularly those from more privileged environments. By 9 years, compared to children from lower SES environments, children from higher SES environments donated more stickers and were less likely not to donate anything. Across both levels of SES, with increasing age level, the range of children's donations diminished, suggesting common socialization influences on all children.

Although individual differences in donations were as large as in adult DG studies, even by 4 years of age, on average, children donated between 20% and 30% of their stickers to another child. This number matches the number donated in many adult studies (Forsythe et al., 1994; Henrich et al., 2005). This suggests that prior conclusions regarding the inherently selfish nature of young children require revision. Should biologically based mechanisms exist to encourage altruistic acts under appropriate conditions, then even the youngest of children should behave altruistically when their cognitive capacities permit understanding of the context. Neural (Fehr & Rockenbach, 2004) and hormonal (Kosfeld et al., 2005) studies indicate an

evolved basis for the maintenance of altruistic norms, which is consistent with the early expression of altruistic behavior.

Developmental findings replicate those obtained by Harbaugh et al. (2003), although evidence for altruistic behavior was obtained earlier in the current study due to the younger ages of the children included. Results also resemble findings from field studies that demonstrate small, albeit inconsistent, developmental increases in altruistic behavior in children (for reviews, see Eisenberg & Fabes, 1998; Murnighan & Saxon, 1998).

Developmental findings also mirror those obtained in a classic study of competitive behavior. In their study, Knight and Kagan (1977) compared lower and higher SES American and lower SES Mexican 6-year-old and 9-year-old children's willingness to allocate differing numbers of chips to a peer while holding constant the number of chips that the participating child received. Paralleling results from the current study, at the age of 6 years, no socioeconomic or ethnic differences were obtained in competitive behavior (defined as allocating only one chip to a peer as opposed to two, three, or four chips, while the participating child always received three chips). By the age of 9 years, however, competitive behavior increased dramatically—but only for higher SES American children, particularly for boys.

This result, in combination with those of the current study, suggests that socialization practices affecting explicit human altruistic and competitive behaviors exert their impact at a similar age. Furthermore, altruistic and competitive behaviors cannot be viewed as mutually exclusive. Presumably as children age, they increasingly learn the specific conditions under which each should be displayed.

The effect of subculture in the current study provides evidence consistent with the influence of local socialization practices. Even though all children in the current study lived within a 5-mile radius of one another, children from differing socioeconomic environments behaved as if adults had communicated information that varied in its prescriptions for absolute levels of altruistic behavior. Although some evolutionarily minded researchers demonstrate skepticism towards the importance of socialization, modern research on socialization practices identifies the mechanisms by which socialization controls behavior. Implicit imitation influences both nonhuman primates' and humans' responses (for a review, see Rizzolatti & Craighero, 2004) and appears in its most nascent forms early in human infancy (Meltzoff & Moore, 1989). Reward and punishment have long been identified as important socializing agents (Fehr & Fischbacher, 2003, 2004; Skinner, 1953). The proportion of individuals within an environment pursuing a particular strategy also influences responses (Axelrod, 1984; Camerer & Fehr, 2006).

The question of why children from higher SES environments learn to behave more altruistically merits investigation. Results from the current study generally correspond to

those from cross-cultural studies—that participation in the labor market may influence willingness to cooperate with genetically unrelated individuals (Henrich et al., 2005). Children attending lower SES schools came from environments in which many of their own or their neighbors' parents were unable to provide their own housing without governmental aid. Thus, although information about individual children's SES was not collected, it can be inferred that many of the adults in lower SES environments were less involved in the labor market than were adults in higher SES environments.

Precisely which factors explain SES differences in the current study remain obscure. Poverty is linked with myriad differences in socialization practices, including less interaction with unfamiliar adults; fewer supportive relationships for parents with children; higher levels of violence; greater familial disruption; less parental monitoring of children; more unresponsive, harsher, punitive, and less consistent and supportive parenting; more aggressive peers and less stable relationships with peers at school; and greater reliance on peers than on parents (for an extensive review, see Evans, 2004). Most pertinent, Evans concludes that those individuals who live in poverty “have weaker social ties, experience less interpersonal trust and norms of reciprocity, and perceive lower levels of instrumental support and mutual aid” (p. 80). These latter findings translate into socialization practices that suggest limited transmission of norms for trusting and relying on others, both of which almost certainly underlie successful participation in a market economy (Henrich et al., 2005). Nonetheless, Henrich et al. conclude that wealth per se does not influence altruistic behavior within subcultures. Thus, the relation between market integration and wealth requires clarification in order to reconcile the current findings with those of Henrich et al.

Finally, although females were not found to behave more altruistically, this is consistent with recent cross-cultural studies (Henrich et al., 2005) and with field studies of behavior directed towards nonkin (Eagly & Crowley, 1986). Sex differences obtained in dictator or other economic games remain inconsistent (e.g., Eckel & Grossman, 1998, 2001; Hill & Gurven, 2004). From an evolutionary perspective, females more than males may benefit from the display of greater altruism towards nonkin in order to reduce the probability of potential conflicts (Trivers, 1971). Certainly, consistent sex differences in competitive and aggressive behavior reflect differential reproductive strategies (Campbell, 1999). Within anonymous interactions with genetically unrelated individuals, however, there exists no evolutionary reason for females to display greater altruism. Only in interactions with kin are females expected to benefit more than males from displays of altruistic behavior (Campbell, 1999).

While it is possible that developmental and socioeconomic differences in the current study could be attributed to genetic differences between children who differ in age and SES rather than to the influence of socialization practices,

this interpretation seems improbable. The results more likely stemmed from differing socialization practices (for a similar argument, see Fehr & Fischbacher, 2003). Further buttressing an environmental interpretation of the effects of age and socioeconomic background is the similarity of the degree of altruistic behavior for 4-year-old children across both levels of SES. Only by 9 years did higher SES children differ significantly in altruistic behavior from their younger or less economically privileged counterparts, suggesting that children acquire differing social norms over time. Also supporting a socialization argument, similar results were obtained by Knight and Kagan (1977) with respect to the development of competitive behavior within one population, but not within a second population. Researchers have demonstrated that, under specific conditions, such as in repeated iterations of the same game, through “intergenerational” communication in iterative economic games, or when reputations are at stake, players learn to behave more altruistically, especially when altruistic rewards or punishment are permitted (for a review, see Fehr & Fischbacher, 2003). Thus, socialization practices influence behavior over even brief time intervals. Nonetheless, longitudinal studies that investigate the relation between specific socialization practices and displays of altruistic behavior would provide even more compelling evidence for the influence of the environment.

That 4-year-old children donated as much as they did, however, is quite remarkable. Although it is possible that children felt more pressured than adults to behave altruistically due to socialization pressures from the interviewers or nearby teachers, every effort was made to allay their concerns by assuring children that donating stickers was optional and that decisions would be completely anonymous. Neither interviewer ever knew how many stickers a particular child donated.

An individual who contributes resources to others when resources are scarce can count on others to reciprocate when that individual is needy (e.g., Kaplan & Hill, 1985). Showing off, costly signaling, and establishing positive reputations also provide putative incentives for cooperation that may provide reproductive benefits (e.g., Fehr & Gächter, 2000; Hawkes, O'Connell, & Blurton Jones, 2001). In the DG, in contrast, donations remain private and occur solely with nonkin, so none of these potential mechanisms applies. More than likely, altruistic behavior directed towards nonkin evolved solely because it increases fitness over the long term.

The most powerful support for the importance of social norms for altruistic behavior directed towards genetically unrelated individuals stems from studies of strong reciprocity in which individuals sacrifice their own resources simply to punish individuals who refuse to behave altruistically (e.g., Fehr, Fischbacher, & Gächter, 2002; Fehr & Gächter, 2002; Gintis, 2000; Gintis, Bowles, Boyd, & Fehr, 2003). Early appearance of altruistic behavior towards nonkin constitutes further evidence for the fundamental role of

altruistic behavior in human social life. Socialization practices later likely determine the extent to which children behave altruistically. Henrich et al. (2005) conclude their study of economic games in 15 small-scale societies by citing the need for more research into the development of social norms in children. The one-shot DG played with highly attractive stimuli in a familiar setting provides a means to examine altruistic behavior in young children without the complexities inherent in other economic games, such as requirements for perspective taking or complex calculations regarding optimal outcomes. Results from this study suggest that the extent of children's altruistic behavior towards genetically unrelated individuals has been underestimated and that development and socialization practices likely play an important role.

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