



# Children weigh equity and efficiency in making allocation decisions: Evidence from the US, Israel, and China

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## ABSTRACT

When children divide resources between others, their decisions generally follow principles of equity (i.e., equal pay for equal work) and efficiency (i.e., maximizing available resources). Yet – just like in the adults' world – these principles sometimes conflict, for example, when an uneven number of resources must be divided between two equally deserving recipients. Previous research has shown that children will throw resources away to avoid creating inequity between recipients. Yet it is unclear how children arrive at such decisions. One possibility is that they follow a general “equity is good” rule and ignore the violation of efficiency, which would suggest that they would be indifferent to resource value in making such decisions. Alternatively, children may be making a sophisticated tradeoff in which they weigh both equity and efficiency. If this is true, then children's tendency to create equitable allocations should be a function of the waste involved, and thus of the value of the resource. To test between these two accounts, we conducted two experiments where 6- to 8-year-old children ( $N=313$ ) had to allocate an uneven number of resources between two other children. Children could choose to either create an inequitable allocation or throw the last resource away. We varied how valuable the resources were, from stickers to iPhones. We found that the more valuable the resource was, the less likely children were to waste and allocate equally. This pattern of results generalized across three countries: the United States, Israel and China. Our findings are the first evidence to suggest that young children make equity-efficiency tradeoffs. We discuss how our findings deepen our understanding of children's resource distribution decisions and their perception of fairness and resource value.

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## 1. Introduction

Societies, adults – and even children – face equity-efficiency dilemmas when allocating resources. These dilemmas pit the fundamental principle of equity (equal rewards for equal parties) against the central principle of efficiency (maximizing resources' value and avoiding waste). Such decisions have been dubbed by economists as “the big tradeoff” (Okun, 1975). Recent findings with children have demonstrated that when facing such dilemmas, young children often favor equity over

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efficiency. For example, a large majority of children who are asked to allocate an extra eraser to one of two equally deserving children, literally throw the eraser in the trash to avoid creating inequity (Shaw and Olson, 2012). Yet the mechanism behind such choices by children is unclear. One possibility is that children might merely be following a general rule whereby “equity is good” or “fairness is good,” without actually considering efficiency and without trading off equity and efficiency. Alternatively, children may arrive at wasteful decisions after weighing both equity and efficiency concerns (and ruling for equity).

The current study aims to investigate if children are making tradeoffs between equity and efficiency when they are distributing resources between other children (and not themselves). We do so by manipulating resource value and examining whether or not it affects children’s tendency to throw away the resource to avoid inequity. If children simply go by an equity heuristic, then they should favor equity regardless of the degree of the efficiency violation (i.e., how valuable is the resource that is being allocated). However, if children do tradeoff equity and efficiency, then increasing the value of the resource (and the waste required for creating an equitable allocation) should make them less likely to favor equity. We conduct this investigation in the United States, Israel and China, examining if our findings generalize beyond one country. We start by reviewing previous work on children’s understanding and use of equity, efficiency, and value in their resource distribution decisions, and then present our empirical findings.

A large body of work in economics and psychology has confirmed the basic idea that children and adults share resources according to equity, or the concept of “equal pay for equal work” (Adams, 1965; Dawes et al., 2007; Hook and Cook, 1979; Porter and Lawler, 1968; Shaw and Choshen-Hillel, 2017). Equity concerns appear early in children’s development. In the second year of life, infants expect that resources will be divided equally between others if there are no underlying differences in merit (Geraci and Surian, 2011; Schmidt and Sommerville, 2011; Sloane et al., 2012). As children grow older, they incorporate principles of equity into their sharing behavior: From age 3 and beyond, they share resources equally between third parties (Enright et al., 1984; Olson and Spelke, 2008; Rizzo and Killen, 2016; Rochat et al., 2009; Sigelman and Waitzman, 1991) and make unequal allocations when there are differences in merit (Baumard et al., 2012; Nelson and Dweck, 1977; Shaw and Olson, 2012). Importantly, it has been demonstrated that children’s pursuit of equity is not because of a mere pursuit of equality or visual symmetry, but a deeper concern with fairness (McAuliffe et al., 2013; Shaw and Olson, 2012). Between the ages of 4 and 8, children will incur costs to themselves not only to avoid inequity that places them at a disadvantage, but also to avoid inequity that places them at an advantage (Blake and McAuliffe, 2011; Blake and Rand, 2010; Hook and Cook, 1979; McAuliffe et al., 2014; Sheskin et al., 2014; Steinbeis and Singer, 2013), with the latter tendency becoming stronger as children grow older (Blake and McAuliffe, 2011; Blake and Rand, 2010; Shaw et al., 2016). Children also like more those who share equitably (Shaw et al., 2012) and punish those who do not (McAuliffe et al., 2015).

Children and adults also care about efficiency in resource distribution. Adults react negatively to people wasting resources and, all else being equal, prefer distributions in which they can give others more resources (Arkes, 1996; Bolton and Alba, 2012; Charness and Rabin, 2002; Choshen-Hillel et al., 2018; Choshen-Hillel and Yaniv, 2011, 2012; Engelmann and Strobel, 2004; Mitchell et al., 1993; Moore and Taylor, 2010). These efficiency concerns also appear early in development. By age 3, children respond negatively to those who throw resources in the trash (Rossano et al., 2011). Furthermore, by age 5 or 6, they prefer equal distributions in which everyone gets more to ones in which everyone gets less (Fehr et al., 2008; Paulus, 2015; Shaw and Olson, 2012; Sheskin et al., 2014).

What happens when equity and efficiency are at conflict? Psychologists have found that when adults are forced to make a choice between equal distributions that are inefficient (i.e., in which the average payoff is lower) and unequal distributions that are more efficient, they will often sacrifice some efficiency for equity (Baron, 1995; Bornstein et al., 2014; Choshen-Hillel et al., 2015; Dawes et al., 2007; Gordon-Hecker et al., 2017a; Gordon-Hecker et al., 2017b; Johansson et al., 2007; Matania and Yaniv, 2007). Importantly, these studies demonstrate that adults weigh concerns with equity against concerns with efficiency. Namely, although adults will sacrifice some efficiency to uphold equity, when the sacrifice to efficiency becomes larger (e.g., resources become more valuable), adults are more likely to create inequity rather than waste resources (Bar-Hillel and Yaari, 1993; Engelmann and Strobel, 2004; for review see Gordon-Hecker et al., 2017a).

Research suggests that children similarly favor equal distributions over efficient ones (Blake and McAuliffe, 2011; Kenward and Dahl, 2011; Shaw et al., 2012). Mounting evidence demonstrates that children will throw resources in the trash in order to avoid creating inequity (for review see, Shaw, 2016). However, these studies do not elucidate the mechanism underlying children’s decisions. Based on our knowledge of adults’ ability to make these equity-efficiency tradeoffs, it is clear that at some point in development, children also make such tradeoffs, but it is currently unclear when. The few studies that have studied such decisions developmentally have found that children do not make equity-efficiency tradeoffs until they are teenagers or young adults (Almas et al., 2010; Sutter et al., 2010). However, these previous studies manipulated efficiency in a way that relied on children being able to count and keep track of multiple resource distributions, which may have made the task artificially complex.

In this paper, we manipulate efficiency by changing the value of the resources in question. We use this manipulation of efficiency because previous research has demonstrated that children attend to value when making decisions relatively early in development. By age 4, children know that some resources are more valuable than others (Echelbarger and Gelman, 2017). Further, 3- to 6-year-old children share fewer stickers in a first party sharing task when the stickers are more valuable (Blake and Rand, 2010). Resource value also guides children’s allocation choices: by six years of age, children try to achieve equity in their allocations of resources to two third-party recipients by attempting to equate not only number of resources but also resource value (Chernyak and Sobel, 2015; Shaw and Olson, 2013; Sheskin et al., 2016). Further,

Rizzo et al. (2016) found that children were more likely to share certain goods unequally if they were not necessary for the recipients' personal health and well-being (than if they were). Thus, we reasoned that manipulating resource value will give us a window into how children may navigate the equity-efficiency tradeoff.

Value might influence children's decisions to throw away resources to avoid inequity in several different ways, depending on whether or not children trade off equity and efficiency. One possibility is that children will not be sensitive to resource value (which determines the level of waste or inefficiency). If children are using a simplistic rule whereby "equity is good," and are not considering efficiency at all in making such decisions, then value should have *no impact* on their decisions. Indeed, related research has found that children's rejections of unfair distributions are not affected by resource value (Blake et al., 2015). It is also possible that as the value of the resource increases, children will waste *more*. This may happen because as the size of the resource increases, so does the size of the inequity between the recipients (e.g., giving one of two children an extra eraser creates an eraser worth of inequity whereas giving this child an extra \$20 bill creates \$20 worth of inequity). If children merely follow an "inequity is bad" rule, reacting more strongly when inequity is greater (Fehr et al., 2008), they should waste more in the name of equity as the value of the resource increases.

Another possibility is that children are making tradeoffs. In this case, increasing the value of the resource could make them *less* likely to waste. This is possible because if children are weighing both factors as adults do, there should be a point at which the sacrifice to efficiency is so great that it would overwhelm their aversion to inequity. We favored this possibility based on the notion that children's resource allocation behavior goes beyond simple inequity aversion and instead involves children balancing several factors in their decision-making (for discussion, see Shaw, 2016). That is, we expected that as the value of the resource increases, children would be less likely to waste the resource in the name of equity.

Our main goal in this paper was to investigate whether children make equity-efficiency tradeoffs by using resource value to guide their decisions. We were also curious whether we would observe a similar pattern of results in several different countries (there can often be substantial variation in how people respond across cultures, see for example Henrich et al., 2010; Nielsen and Haun, 2015). We tested the United States, Israel, and China (see the next section for more information on these countries). We would like to emphasize that our experiments were primarily aimed at examining the way children dealt with equity-efficiency conflicts within each culture, and we expected that we would find the same pattern across cultures (i.e., that as the resource value increased, children would be less likely to waste the resource).

## 2. Current studies

In order to examine if children are weighing both equity and efficiency when deciding how to distribute resources between other children, we examine if children become less likely to waste resources in the name of equity when the resources are more valuable. We test 6 to 8-year-old children because this is the age when children begin to develop more stable and adult like fairness concerns (Hook and Cook, 1979; McAuliffe et al., 2017; Schmidt et al., 2016). Further, this is the age range tested in previous work on children's tendency to waste resources in the name of equity (Shaw et al., 2016; Shaw and Olson, 2012).

In our experiments, children were asked to distribute five resources between two other equally deserving children. The participants were told that each of the recipients had received two resources, and were asked if they wanted to give the final (fifth) resource to one of the two recipients or throw it away (for a similar design see Shaw and Olson, 2012). This decision was presented to the children as an actual decision they had to make, and they were given actual resources to allocate. In fact, their decisions were not carried out and had no consequences (see General Discussion for the limitations of this deceptive procedure). Importantly, we systematically varied the value of the resources that the children were distributing. In Experiment 1, children distributed relatively low value resources (i.e., toy erasers), medium value resources (i.e., markers), or high value resources (i.e., ~\$20 dollar bills). In Experiment 2, children distributed a low-value resource (paper clips) and a high-value resource (iPhones). We made the same prediction for both studies: if children do indeed make equity-efficiency tradeoffs when deciding whether or not to waste resources in the name of equity, then they should be less likely to waste resources as the resources become more valuable.

We tested our prediction in three different populations, with children coming from the United States, Israel, and China. Our goal was to demonstrate that children in different countries all make equity-efficiency tradeoffs. Specifically, our samples come from two western nations (the United States and Israel) and from China, and thus vary along the important individualism–collectivism spectrum (Hofstede and Bond, 1988; Hofstede et al., 2010; Munroe and Munroe, 1977; Rochat et al., 2009; Zhang and Yang, 1998) as well as in other aspects such as values and socio-demographical characteristics (Gelfand et al., 2011; Oyserman, 2017; Sagiv et al., 2010; Schwartz, 2009). Note that we make no culture-specific predictions. Instead, our goal is to test whether the same pattern of results is obtained in these different countries. If we indeed find the effect of value on children's decisions in all countries, it would suggest that the effect is robust enough to occur in different societies. Such findings would attest to the generalizability of the effect, but would not suggest that children all over the world make such tradeoffs (as we only tested three countries). If we do not find the same effect in the three countries, that could also be interesting (but more difficult to interpret). We will not further discuss culture here as this was not the primary purpose of the study, but we return to this issue in the general discussion and discuss other cross-cultural work on inequity aversion.

## 2.1. Experiment 1

### 2.1.1. Method

**2.1.1.1. Participants.** The participants were 214 six to eight-year-old children ( $M=88.54$  months,  $SD=10.81$  months; 48% female). Children were randomly assigned into the low value condition (70 participants;  $M=88.23$  months;  $SD=11.36$  months; 50% female), medium value condition (75 participants;  $M=88.00$  months;  $SD=10.68$  months; 43% female), or high value condition (69 participants;  $M=89.44$  months;  $SD=10.48$ ; 52% female). We collected ~24 children per cell, based on effects with similar samples obtained in similar fairness related research (Shaw et al., 2012; Shaw and Olson, 2012). We did not analyze any data before data collection was completed.

The American participants consisted of 69 six to eight-year-old children ( $M=85.30$  months;  $SD=10.93$  months; 46% female). The American children were recruited from a local Midwestern science museum in the United States. The participants were, presumably, primarily of high or middle-class SES given that they were run at a science museum.

The Israeli participants consisted of 74 six to eight-year-old children ( $M=87.68$  months;  $SD=10.53$  months; 46% female). The Israeli children were recruited from the local science museum in Jerusalem. Only fluent-Hebrew speakers were recruited. The participants were, presumably, middle-class SES given that they were run at a science museum.

The Chinese participants consisted of 71 six to eight-year-old children ( $M=92.61$  months;  $SD=9.33$  months; 52% female). Only fluent-Chinese speakers were recruited. To match the American and Israeli sample as best as possible, the Chinese children were recruited from a public elementary school with middle-class SES in a central city in China. Still, the Chinese children might have been of lower SES overall as they were drawn from one of the mid-tier cities in China.

**2.1.1.2. Materials.** Materials included three resources that differed in value: toy erasers (low value), markers (medium value), and money (high value). The same low-value erasers were used in all three countries. These erasers came in fun shapes and cost \$0.02 each (see also Shaw and Olson, 2012). The medium-value markers used in all three countries were Crayola markers that cost \$0.57 each. For the high-value resource we used local currency, which were \$20 bills in the US, 50-Shekel bills in Israel (worth about \$14), and 100-Yuan bills in China (worth about \$14.49).

We used objective monetary value as a guide to the perceived subjective value of these resources. A possible concern is that the subjective value that each child assigns to the resources may differ from the objective value (for instance, a child may value a fun eraser more than a money bill). However, numerous developmental studies that examined children's consideration of value have shown that there is a clear correspondence between objective and subjective value (Blake and Rand, 2010; Chernyak and Sobel, 2015; Shaw and Olson, 2013; Sheskin et al., 2016). Importantly, previous research with an American sample has demonstrated that children indeed think that the erasers we used in this experiment are a much lower valued reward than \$20 bills (Shaw and Olson, 2013). Since the Chinese population was expected to be the most different from the American population, we tested Chinese children's perception of value in a separate study. Specifically, we asked six to eight-year-old Chinese children ( $N=40$ ,  $M=88.32$  months;  $SD=8.30$  months; 50% female) to rate which of the three resources (erasers, Crayola markers, and 100 Yuan bills) is the most valuable, and which is the least valuable. Our findings confirmed that Chinese children perceived the value of the resources in the same way that American children did (and in line with their monetary value). In particular, 92.5% of the children (37/40) thought that the 100 Yuan Bill was the most valuable resource, and 95% of the children (38/40) thought that the eraser was the least valuable resource.

### 2.1.2. Procedure

Children were tested individually by an experimenter fluent in the local language. The children assigned to the low value (erasers) condition were read the following scenario that closely followed Shaw and Olson (2012).

Thanks for playing this game with me. Earlier today two kids named Mark and Dan did a great job cleaning up their room, and we want to give them some erasers as a prize. The problem is I don't know how many erasers to give them. Can you help me with that? Great.

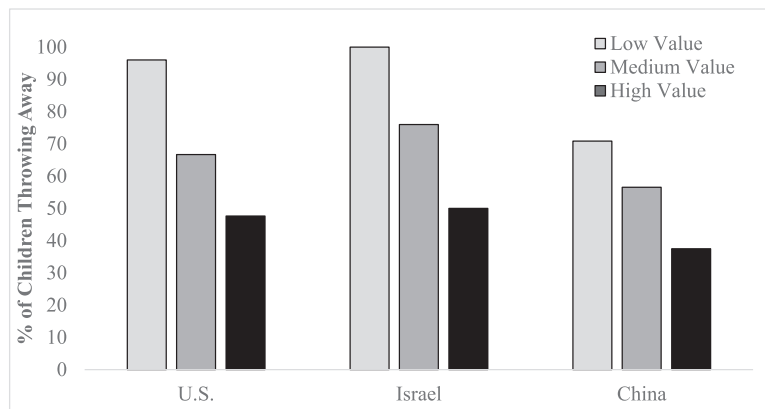
The experimenter then showed the children five erasers and told them:

You get to decide how many erasers Mark and Dan will get. We have these five erasers. We have one for Mark, one for Dan, one for Mark, one for Dan. Uh oh! We have one eraser left over.

The erasers were placed correspondingly by the experimenter onto two envelopes (labeled "Mark" and "Dan"). Children were asked, "Should I give it to Dan, or should I throw it away?" Whether "Give it to Dan" or "throw it away" appeared first in the question was counterbalanced across individual child participants. The children assigned to the medium value condition (markers) and high value condition (local currency bills) were read the same script except that instead of five erasers, five markers or five bills were used in those conditions.

A translated version of this same procedure was run in Israel and in China. The names "Mark" and "Dan" were changed to the Israeli names "Michael" and "Dan" and to the Chinese names "Xiao Gang" and "Xiao Ming" respectively.

In Israel and in China, the children in the low value condition participated in an additional control condition to ensure that they did not merely want to waste the resources in question. We counterbalanced the order of the primary question and the control question within participants. In the control condition, the child was told about two new children, who also participated in the study (see full script in the Appendix). The child was told that there were overall four erasers to allocate, and that each recipient had already received one. The child was then asked if s/he wanted to give an additional eraser to each of the two recipients or to throw the two erasers in the trash. If children cared about efficiency and equality, then they



**Fig. 1.** Percentage of participants choosing to throw away a resource in the U.S., Israel, and China in the unequal condition, by value of resource, in Experiment 1.

should not throw the resources away in this case because the resources were allocated equally. This control question was important because it helped rule out the possibility that children decided to throw away the resource in the test conditions because they thought the resource was worthless or because they enjoyed being silly. This control condition was not run in the American sample because it has already been reported in previous work (Shaw and Olson, 2012).

Note that the experimenter documented the participants' decisions, but did not carry them out (i.e., other children were not paid according to the participants' choices in this study).

### 2.1.3. Results

Fig. 1 presents the percentage of participants in Experiment 1 who chose to throw away the extra resource rather than give it to Dan (in the unequal conditions), by resource-value and country. Table 1 presents the coefficients from a Probit regression on the outcomes of Experiment 1, and Table 2 presents the corresponding average marginal effects. In this regression, a dummy variable indicating whether the participant threw the resource away (rather than gave it to Dan) is regressed on the resource-value categories, a dummy variable for the equal condition and gender, and age of the participant. We add interaction terms between gender and the resource categories. Standard errors are clustered at the individual level, to allow for correlation between the outcomes of individuals who participated in both the equal and unequal condition. Columns 1–3 present country specific regressions and column 4 combines all countries adding a country fixed effect and interactions between country and resource, and country and gender.

First, we examined participants' allocation decisions with different resource values across the three countries. Importantly, we found that the percentage of participants who threw away the resource across the three countries decreased with the value of the resource (see Fig. 1 and Table 2). Specifically, children were less likely to throw away resources in the high value condition (money) than in the low value condition (markers), by 34 percentage points. This effect was significant both for Israel (by 37.5 ppts) and for China (by 27.4 ppts). For the US, Fig. 1 suggests the same trend, but this term dropped out of the regression because of perfect prediction of success. Further, children were also significantly less likely to throw away resources in the name of equity in the medium value condition than in the low value condition (by 20.1 ppts). This effect was significant for Israel (by 18.6 ppts), but not for China. Once again, the same trend can be detected in Fig. 1 for the US, but cannot be computed for technical reasons. Taken together, these results support our prediction that children take into account efficiency in their decision to throw away resources in the name of equity.

As noted above, we included a within-participant control condition in Israel and in China to assess children's willingness to throw away a low-value resource when this would not create inequity between others. In the control condition, very few participants opted to throw away resources when giving to others would maintain equity in both Israel (1 out of 22, 4.5%) and China (1 out of 24, 4%). In the overall regression, participants were significantly less likely to throw away the resource in the equal than in the unequal condition (see Table 2). This was true both for Israel (by 200 ppts) and for China (by 68 ppts). Note that we had no American sample for this condition, but Shaw and Olson, 2012 ran the same task and found very low rates of throwing away in an American sample. These results suggest that children in China and Israel do not want to throw away resources unless giving this resource will create inequity.

We next examined if there were different overall rates of throwing away among the three countries. We found that children in China threw away resources less frequently than children in the US and in Israel (by 17 ppts, see Fig. 1 and Table 2).

Age (represented in months) had no significant effect on the outcome in all specifications (See Table 2). Gender had no overall effect as well. Being a female decreased the probability to throw away in Israel (by 16 ppts), but not so in the US or China. Interactions of medium-value resource and female and high-value resource and female were not significant overall (they were significant in Israel, where females were less likely to throw away medium- and high-value resources

**Table 1**  
 Probit regression, the probability to throw-away (Experiment 1), by country.

Variables	(1) US	(2) Israel	(3) China	(4) All
Medium-value (marker)	-1.197 (0.666)	-7.809** (0.748)	-0.209 (0.517)	-1.201* (0.596)
High-value (money)	-1.637** (0.631)	-9.054** (0.688)	-1.105 (0.640)	-1.691** (0.587)
Equal		-10.79** (0.182)	-2.304** (0.481)	-3.082** (0.547)
Israel				0.585 (0.618)
China				-0.676 (0.649)
Female	0.992 (0.751)	-3.967** (0.580)	-0.000193 (0.494)	1.269* (0.545)
Age	0.0240 (0.0187)	-0.00738 (0.0175)	-0.0107 (0.0163)	-0.00142 (0.00969)
Medium-value*female	-0.399 (0.919)	2.657** (0.830)	-0.546 (0.759)	-0.690 (0.486)
High-value*female		3.541** (0.792)	0.330 (0.765)	0.0843 (0.484)
Medium-value *Israel				0.731 (0.711)
Medium-value *China				0.893 (0.718)
High-value* Israel				0.0213 (0.715)
High-value *China				0.577 (0.730)
Female* Israel				-1.770** (0.537)
Female*China				-1.149* (0.547)
Constant	-0.693 (1.690)	9.965** (1.918)	1.537 (1.609)	1.456 (1.006)
Observations	55	96	95	260

Robust standard errors in parentheses.

\*\*  $p < 0.01$ .

\*  $p < 0.05$ .

**Table 2**  
 Average marginal effects from the probit regression, Experiment 1.

Variables	(1) US	(2) Israel	(3) China	(4) All
Medium-value		-0.186** (0.0581)	-0.146 (0.114)	-0.201** (0.0533)
High-value		-0.375** (0.0815)	-0.274** (0.106)	-0.337** (0.0556)
Equal		-2.006** (0.242)	-0.679** (0.102)	-0.772** (0.107)
Israel				0.000744 (0.0638)
China				-0.173* (0.0725)
Female		-0.161* (0.0699)	-0.0212 (0.0942)	-0.00391 (0.0507)
Age	0.00743 (0.00568)	-0.00137 (0.00325)	-0.00316 (0.00481)	-0.000355 (0.00243)
Observations	55	96	95	260

Standard errors in parentheses.

\*\*  $p < 0.01$ .

\*  $p < 0.05$ .



than males<sup>1</sup>). The interactions of female and Israel and female and China were significantly negative (see Table 1). There were no other significant interactions.

#### 2.1.4. Discussion

Findings from three countries demonstrated that children wasted resources to maintain equity, but their willingness to waste decreased as the resources became more valuable and thus the sacrifice to efficiency became larger. When the resource was relatively low in value, 6- to 8- year-old children were quite willing to throw it in the trash in order to avoid creating inequity between two other recipients. That is, the majority of children threw toy erasers or markers into the trash to avoid creating inequity between two children. However, when the resources were higher in value, children were much more reluctant to throw the resource in the trash presumably because they thought the sacrifice to efficiency would be too great. These results suggest that children are not simply following a general “equity is good” rule. Instead, children seem to be weighing both equity and efficiency in deciding how to allocate resources between others.

## 2.2. Experiment 2

In Experiment 1, we found that children were less likely to throw away resources in the name of equity when the resources were more valuable. This effect was most prominent when children were asked to throw away a high value resource, which consisted of money bills. Because money is a unique kind of object (e.g., it is a secondary reinforce and there may be specific prohibitions against throwing away money), it is possible that the effect we obtained in children’s judgments was not driven by value per se. To validate our findings, in Experiment 2 we used a different high value resource—an iPhone. If children’s reactions in our previous study were based on the fact that money has a special status, then we should see children treating the iPhone more like they treated the lower value resource in Experiment 1. However, if children were using value in their judgments, then they should be much less likely to throw away an iPhone than a lower valued resource. Note, we only tested the results in the United States and in China for Experiment 2 because the results in Israel and the United States were highly similar in Experiment 1.

### 2.2.1. Method

**2.2.1.1. Participants.** The participants were 99 six- to eight-year-old children ( $M=91.12$  months,  $SD=10.39$  months; 55% female). Children were randomly assigned into the low value condition (47 participants;  $M=90.37$  months;  $SD=10.52$  months; 60% female) and the high value condition (52 participants;  $M=89.44$  months;  $SD=10.32$ ; 50% female).

The American participants consisted of 49 six- to eight-year-old children ( $M=89.91$  months;  $SD=10.63$  months; 47% female). The American children were recruited the same way as in Experiment 1.

The Chinese participants consisted of 50 six- to eight-year-old children ( $M=92.31$  months;  $SD=10.11$  months; 62% female). The Chinese children were recruited the same way as in Experiment 1.

### 2.2.2. Procedure

The method was the same as in Experiment 1. The main difference was that in Experiment 2 participants were assigned to one of two value conditions: a low value condition where the resource being allocated was now paper clips, and a high value condition where the resource was now iPhones. In both conditions, children were told there were five resources to allocate. They were told that two children already received two resources each, and were asked if they wanted to give the final resource to one of the children or if they wanted to throw it in the trash.

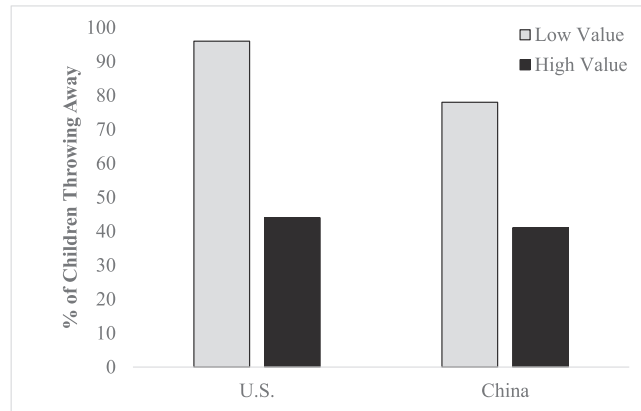
In Experiment 2, in a within-subject design, we also included the same control condition that was used in Israel and in China in Experiment 1, with paper clips instead of erasers (see full script in the Appendix). This control question was particularly important in this case because it was possible that children thought that paper clips were completely valueless, and would throw them away regardless of equity concerns.

### 2.2.3. Results

Fig. 2 presents the percentage of participants in Experiment 2 who chose to throw away the extra resource rather than give it to Dan (in the unequal conditions), by resource-value and country. Table 3 presents the coefficients from a probit regression on the outcomes of Experiment 2, and Table 4 presents the corresponding average marginal effects. The dependent variable is again a variable indicating whether the participant chose to throw a resource away rather than to give it. These regressions include results from both the equal and the unequal conditions, and standard errors are clustered at the individual level. Columns 1–2 present the results for the US and China separately, and column 3 combines both countries.

We first examined participants’ allocation decisions of resources with different value in the two countries (see Fig. 2). In the US and in China, children were less likely to throw away the resource in the high-value condition (iPhones) than in the low value condition (paperclips), by 21 ppts. Specifically, making a decision on a high-value resource rather than on a low-value one significantly decreased the probability to throw away the resource (by 54.5 ppts in the US, and by 15.1 ppts

<sup>1</sup> Note that while we enter gender as a predictor to the regression, we did not make any predictions on gender, and did not balance gender across the experimental conditions. It thus happened, that some conditions had a greater proportion of females than others, and this imbalance may account for these sporadic interactions.



**Fig. 2.** Percentage of participants choosing to throw away a resource in the unequal condition in U.S. and China, by value of resource, in Experiment 2.

**Table 3**

Probit regression coefficients, the probability to throw-away (Experiment 2), by country.

Variables	(1) US	(2) China	(3) Both
High-value (iPhone)	-2.358** (0.616)	-0.782 (0.414)	-2.083** (0.579)
Equal		-2.426** (0.560)	-3.137** (0.603)
China			-0.198 (0.425)
Age	-0.0121 (0.0267)	-0.00873 (0.0151)	-0.0101 (0.0123)
Female	1.185* (0.554)	-0.551 (0.473)	0.282 (0.305)
High-value*female		0.133 (0.673)	0.849 (0.647)
High-value*China			1.207 (0.693)
Female*China			-0.953 (0.650)
High-value*female*China			-0.665 (1.024)
Constant	2.572 (2.369)	1.641 (1.357)	2.142 (1.113)
Observations	49	100	198

Robust standard errors in parentheses.

\*\*  $p < 0.01$ .

\*  $p < 0.05$ .

**Table 4**

Average marginal effects from the Probit regression, Experiment 2.

Variables	(1) US	(2) China	(3) Both
High-value (iPhones)	-0.545** (0.0978)	-0.151* (0.0619)	-0.207** (0.0401)
Equal		-0.491** (0.0516)	-0.512** (0.0425)
China			-0.0240 (0.0414)
Age	-0.00255 (0.00564)	-0.00176 (0.00309)	-0.00165 (0.00205)
Female	0.248* (0.0975)	-0.0978 (0.0674)	0.00778 (0.0421)
Observations	49	100	198

Standard errors in parentheses.

\*\*  $p < 0.01$ .

\*  $p < 0.05$ .



in China). These findings provide further support for our hypothesis that children are less likely to waste resources in the name of equity the more valuable the resources are.

As noted above, we included a within-participant control condition to assess children's willingness to throw away a resource when this would not create inequity between others. In the equal condition, almost no participant chose to throw away the resources (in the US, 0 out of 49, 0%, and in China, 2 out of 50, 4%). In the overall regression, participants were significantly less likely to throw away the resource in the equal than in the unequal condition (by 51 ppts, see Table 4). This is also true in China (by 49 ppts). For the US, this term dropped out of the regression because of perfect prediction of success (no throwing away). These findings suggest that children were much more likely to throw away resources in the inequity condition than in the equity condition, and this was true for both low and high value resources. Thus, it seems that children in both the US and China do not want to throw away resources unless giving these resources will create inequity.

Age (represented in months) had no significant effect on the likelihood to throw away in all specifications (see Table 4). Gender had no significant effect on the overall likelihood to throw away (but it did in the US). In the overall regression (Table 3, column 3), we added interaction terms between resource-value, country and gender. There were no significant interactions.

#### 2.2.4. Discussion

Replicating our results from Experiment 1, we found that children were more likely to throw away a resource to avoid creating inequity between others when the resource was low value rather than high value. Importantly, in this study the high value resource was not money but a consumer good, suggesting that our results from the previous experiment were not driven by the fact that children had different intuitions about money bills. These results suggest that children appear to use both equity and efficiency in deciding how to allocate resources between others.

Note that in Experiment 2 we did not find the difference found in Experiment 1 between the United States and China in children's tendency to waste resources. This might have been partly because in Experiment 2 we chose a very low valued resource (paper clips), where both Chinese and U.S. children may have been at ceiling in terms of throwing the resource away. Future research should further investigate these possible cross-cultural differences.

### 3. General discussion

Across two studies and three different countries, we found that children wasted resources to maintain equity and that, importantly, they became substantially less willing to do so as the value of the resource increased. When the resource was relatively low in value (a paper clip or a toy eraser), the vast majority of 6- to 8- year-old children threw the resource in the trash to avoid inequity. However, when the efficiency violation of wasting the resource increased because the resource in question was more valuable (a Crayola marker, a \$20 bill or an iPhone), far fewer children were willing to throw the resource in the trash. Taken together, these results provide evidence in support of our main hypothesis that children are weighing both equity and efficiency, making sophisticated judgments in deciding how they should share with others.

#### 3.1. Value and the equity-efficiency tradeoff

There is a wealth of research suggesting that children increasingly distribute resources according to equity as they grow older. However, whether or not children weigh efficiency against equity considerations has been an open question. Some previous authors had theorized that children made equity-efficiency tradeoffs and might use resource value for this goal, but did not test these claims empirically (Paulus, 2015; Shaw and Olson, 2012). Other previous results could be explained by children internalizing a general rule like "equity is good" (Blake and McAuliffe, 2011; Fehr et al., 2008; Kogut, 2012) or "avoid partiality" (Shaw and Olson, 2014; Shaw et al., 2016), and do not provide any evidence for children reacting to the efficiency of the allocation. The current results suggest that children do understand that there may be a cost to favoring equity over efficiency, and that they evaluate this cost in their decision-making, refusing to pay it when it rises over a certain threshold.

The present results also extend previous work that has examined how children use resource value in distributing resources to others. Previous work has found that 6-year-old children were more selfish with valuable resources in their first party sharing (Blake and Rand, 2010; Chernyak and Sobel, 2015; Sheskin et al., 2016). However, previous work has not used value as a means to investigate if children make equity-efficiency tradeoffs.

The current results are seemingly at odds with a supplemental study in Blake et al., (2015) who found no influence of value on children's inequity aversion. However, that study used only a limited range of values (ranging from peanuts and crackers in the low value resources to skittles in the high value resources). It is thus possible that their manipulation of value was not strong enough to elicit an effect.

It is not entirely clear why value impacts children's efficiency concerns more strongly than their fairness concerns. Indeed, previous work on value and inequity (e.g., Shaw and Olson, 2013) might suggest the opposite of what we predicted and found: that children should be *more* likely to waste resources in the name of equity when the value of the resources is greater, because in these cases the potential inequity is greater (and should trump concerns with efficiency). These results could be reconciled with previous findings if children's fairness concerns were more dichotomous (was it fair or not) than their efficiency concerns. Dichotomous preferences make sense if fairness concerns are partly aimed at avoiding a demonstration of preference for one person over the other (Shaw, 2013; Shaw and Olson, 2014)—whether you give someone an

additional eraser or an additional \$20, people will know that you like that person more (Liberman and Shaw, 2017). If this is the case, we would expect what we found here: value having a diminishing impact on “fairness,” but not on efficiency (for a related model in adult decision making see, Kleiman-Weiner et al., 2017). The findings from the current research, which are also in line with what has been found in adult research on resource distribution (Mitchell et al., 1993), should be further investigated by future research.

How do children arrive at making equity–efficiency tradeoffs? Clearly, children get messages about fairness and about not wasting resources from their parents and at school. However, it is unlikely that children are explicitly told how to trade-off these two concerns. Such an account would have to suggest that children are explicitly told to waste resources to maintain equity, but just to the extent that resources are under a certain value. This seems implausible. Children instead appear to have two different concerns that they are weighing ad hoc when they construct their decisions. Our results contribute to a growing body of literature that suggests children’s concerns with fairness, how they distribute resources, and how they evaluate others for distributing resources are quite complex (Benozio and Diesendruck, 2015; DeJesus et al., 2014; Enright et al., 2017; Ng et al., 2011; Olson et al., 2008; Renno and Shutts, 2015; Rizzo et al., 2016; Shaw et al., 2014).

### 3.2. Culture and resource value

Our results reveal that 6- to 8-year-old children make equity–efficiency tradeoffs in three different countries, Israel, China and the United States. Despite the many differences between these countries, we replicated the same basic pattern: children became less likely to waste a resource to avoid inequity as the resource became more valuable. This finding of course does not mean that children make such tradeoffs universally, but it does suggest that this is not a phenomenon that is restricted to one set of children from one country (see Henrich et al., 2010). Clearly, culture and circumstances exert a powerful influence on children’s sharing behavior (e.g., Rochat et al., 2009), making the continuity between reactions in these different countries all the more interesting.

Our results also suggest that overall, children in China were somewhat less willing to waste resources than the children in America and in Israel (this pattern was significant in Experiment 1, and appeared in Experiment 2 but was insignificant). What might account for such a pattern of results where there is variation across cultures (Blake et al., 2015; Paulus, 2015; Shaw and Olson, 2012)? We suggest that there are at least two broad possibilities: cultural or wealth differences. Firstly, in comparison to the United States and Israel, China is a more collectivist society (Sagiv et al., 2010; Schwartz, 2009), which might explain Chinese children’s reluctance to waste. Whereas individualistic cultures tend to focus on the notion of equity (Beteille, 1986), collective societies tend to place a greater emphasis on cooperation and the welfare of the group (Munroe and Munroe, 1977; Rochat et al., 2009; Zhang and Yang, 1998). It could be that due to China’s collectivist culture, which probably emphasizes efficiency as an important value for collective group welfare, Chinese children are relatively more focused on efficiency than American and Israeli children. Secondly, China is a poorer country than the United States and Israel, meaning that our Chinese participants likely had fewer resources than our American or Israeli participants. This wealth discrepancy may have led Chinese children to place a higher value on the resources than the American or Israeli children (put simply, they appreciated toy erasers more than their American or Israeli counterparts). We note that in Experiment 1, Chinese children were as willing to throw away the low value resource (a toy eraser) as American and Israeli children were willing to throw away the medium value resource (a marker). If erasers are about as valuable to Chinese children as markers are to children in Israel and the United States, one would expect that children in China would be less willing to waste resources because they find most resources to be more precious and valuable than children in Israel and the United States. Note, though, that in Experiment 2, we did not find any differences in American and Chinese children’s tendency to throw away paper clips or iPhones (maybe due to a floor/ceiling effect), and so we cannot reach a clear conclusion on differences between the countries, not to mention tracking such differences to culture or wealth.

Our findings that children’s reactions to inequity depend on the value of the resources at stake, point to an important general challenge in conducting cross-cultural research. They join a growing list of studies that find some inequity aversion across cultures but also find differences in rates of inequity aversion (Blake et al., 2015; Paulus, 2015; Rochat et al., 2009; Shaw and Olson, 2012). When one finds a difference between two cultures, the first explanation that comes to mind is differences in cultural norms or in ideas about what is fair. However, if the two societies differ not just by culture but also by how wealthy they are, it is difficult to know what is driving the gap. Without varying or measuring the value of the resource in question, it can be difficult to know if different societies place a different value on fairness concerns or simply place a different value on the resources being distributed. The value that one places on a resource will presumably be influenced by poverty, as previous research has demonstrated that poor adults are less likely to waste resources than more affluent adults (for a review, see Mullainathan and Shafir, 2014). In line with our current findings, value may partially explain why children in Uganda are less willing to waste resources to uphold inequity than children in the United States and South Africa (Paulus, 2015; Shaw and Olson, 2012)—perhaps resources are more scarce and so Ugandan children are less inclined to waste resources than American ones. It is worth noting that children in Uganda did not necessarily value fairness less than children in other countries, indeed they were one of the few countries besides the United States where children showed advantageous inequity aversion (Blake et al., 2015). While we are not suggesting that cross-cultural differences in fair behavior are driven exclusively by resource value, our studies revealed that some of this variance might be explained by it. Other interesting cross-cultural questions about resource sharing (e.g., what kinds of rules justify inequality) cannot be explained by resource value, and should be explored by future research.

### 3.3. Limitations

We note a few limitations of the current experiments. First, our studies involved only third-party resource distribution, where children had to allocate resources to other children. Similar dilemmas arise at first party decisions, which we did not test. The reason is that if children had to throw away their own valuable resources (e.g., an iPhone) to maintain equity between them and another child, we would expect that they would be highly influenced by value; indeed, previous research has shown that children are more selfish with valuable as compared to non-valuable resources (Blake and Rand, 2010). However, such a result would give us little insight into whether children were weighing equity and efficiency in their decision-making, or simply responding to their personal incentives (not to throw away their own resources).

Second, our studies were conducted in the presence of an experimenter and so it is possible that children were responding to demand characteristics by the experimenter. While we acknowledge that this might have influenced children's absolute rate of wasting resources, it is worth noting that this experiment was conducted between participants and so children could not have known what we were manipulating. Even if they knew, it is unlikely that they could guess the experimental hypothesis, without having some grasp of the equity-efficiency tradeoff we intended to investigate (should they throw away a high value resource to avoid extreme inequity? Or should they give it to avoid the waste?). Thus, our main finding of an effect of value is unlikely to be the result of demand characteristics.

Third, our study involved deception; we told participants that their decisions will affect another child, but in fact their decisions were not carried out and did not affect anyone. Thus, children may have realized that they have been deceived by the experimenter, and that their decision is not consequential (i.e., no one is going to throw erasers, crayons or iPhones in the trash). Generally, studies using deception or hypothetical decisions are common practice in psychology, but not so in experimental economics. There is a lively debate between these two fields, on the necessity, and the potential disadvantages, of deception (Barrera and Simpson, 2012; Cook and Yamagishi, 2008; Hertwig and Ortmann, 2001). The main concern that was raised against using deception is a methodological one, whereby distrust of the experimenter or the instructions might lead participants to behave in experiments differently than they normally do (Bonetti, 1998; Hertwig and Ortmann, 2001, 2008; Zultan, 2015). Experimental economists raise similar concerns with regard to the common practice of psychologists for using hypothetical questions (e.g., participants might act in a more demand-characteristic manner if no incentives are provided, Camerer and Hogarth, 1999; Carson et al., 2014). However, we believe that in our current experiments, deception and hypothetical bias are less of a concern, because they would both go *against* our hypothesis. Specifically, if participants did not believe that real items are thrown in the trash, then the value of the resources should not matter to them, and we would not have found that it affects their decisions. Thus, children's allocation behavior in reality should be influenced by value at least as much as we have documented in our studies (and maybe even more).

### 3.4. Conclusion

Our pattern of results, which was obtained in three different countries, demonstrates that 6- to 8-year-old children make equity-efficiency tradeoffs when deciding how to allocate resources. Children were quite willing to throw low value resources in the trash to avoid inequity, but became much less willing to do so as the resources became more valuable. This is the first evidence that children are spontaneously making such tradeoffs. Children seem to integrate a number of factors when making their decisions about how to share resources with others, and we are just beginning to understand how complex their intuitions about such allocations truly are.

### Declarations of interest

None.

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### Appendix. texts for the Equity control conditions in Experiment 1 and 2

#### For Israeli sample

Israeli children in Experiment 1 in the low value (eraser) condition completed the following equity condition, either before or after the main part of the study (the inequity condition). They were read the following instructions in Hebrew:

Two kids named Haim and Gil did a great job cleaning up their room, and we also want to give them erasers as a prize. We have these four erasers. One for Haim and one for Gil. Uh oh! We have two erasers left over.

The erasers were placed correspondingly by the experimenter into paper-folded boxes (labeled “Haim” and “Gil”). The children were asked, “Should I give one to Haim and one to Gil, or should I throw them away?” Whether “give one to Haim and one Gil” or “throw them away” was mentioned first was counterbalanced across individual child participant.

### For Chinese Sample

The Chinese children in Experiment 1 assigned to the low value (eraser) condition were read the exact same story for their participation in the low value (eraser) equity control condition, but in Chinese. Additionally, the names of “Haim” and “Gil” were changed to Chinese names of “Xiao Hua” and “Xiao Shu”.

The Chinese children in Experiment 2 assigned to the low value (paper clip) condition also participated in low value (paper clip) equity control condition. The story was the same and the Chinese names of “Xiao Hua” and Xiao Shu” were used. The only difference was that instead of erasers, paper clips were used.

## References

- Adams, J., 1965. Inequity in social exchange. In: Berkowitz, L. (Ed.), *In: Advances in Experimental Social Psychology*, vol. 2. Academic Press, New York, NY, pp. 267–299.
- Almas, I., Cappelen, A.W., Sorensen, E.O., Tungodden, B., 2010. Fairness and the development of inequality acceptance. *Science* 328, 1176–1178.
- Arkes, H.R., 1996. The psychology of waste. *J. Behav. Decis. Mak.* 9, 213–224.
- Bar-Hillel, M., Yaari, M., 1993. Judgments of distributive justice. In: Mellers, B.A., Baron, J. (Eds.), *Psychological Perspectives on Justice: Theory and Applications*. Cambridge University Press, New York, NY, pp. 56–84.
- Baron, J., 1995. Blind justice: fairness to groups and the do-no-harm principle. *J. Behav. Decis. Mak.* 8, 71–83.
- Barrera, D., Simpson, B., 2012. Much ado about deception: consequences of deceiving research participants in the social sciences. *Sociol. Methods Res.* 41, 383–413.
- Baumard, N., Mascaro, O., Chevallier, C., 2012. Preschoolers are able to take merit into account when distributing goods. *Dev. Psychol.* 48, 492–498.
- Benozio, A., Diesendruck, G., 2015. Parochialism in preschool boys' resource allocation. *Evol. Hum. Behav.* 36, 256–264.
- Beteille, A., 1986. Individualism and equality. *Curr. Anthropol.* 27, 121–134.
- Blake, P.R., McAuliffe, K., 2011. I had so much it didn't seem fair: eight-year olds reject two forms of inequity. *Cognition* 120, 215–224.
- Blake, P.R., McAuliffe, K., Corbit, J., Callaghan, T.C., Barry, O., Bowie, A., ... Warneken, F., 2015. The ontogeny of fairness in seven societies. *Nature* 528, 258–261.
- Blake, P.R., Rand, D.G., 2010. Currency value moderates equity preference among young children. *Evol. Hum. Behav.* 31, 210–218.
- Bolton, L.E., Alba, J.W., 2012. When less is more: consumer aversion to unused utility. *J. Consum. Psychol.* 22, 369–383.
- Bonetti, S., 1998. Experimental economics and deception. *J. Econ. Psychol.* 19, 377–395.
- Bornstein, B.H., Gervais, S.J., Dietrich, H.L., Escamilla, J., 2014. All else being equal: overcoming the egalitarian norm. In: Bornstein, B., Wiener, R. (Eds.), *Justice, Conflict and Wellbeing*. Springer Science and Business Media, New York, NY, pp. 3–30.
- Camerer, C.F., Hogarth, H.M., 1999. The effects of financial incentives in experiments: a review and capital-labor-production framework. *J. Risk Uncertain.* 19, 7–42.
- Carson, R.T., Groves, t., List, J.A., 2014. Consequentiality: a theoretical and experimental exploration of a single binary choice. *J. Assoc. Environ. Resource Econom.* 1, 171–207.
- Charness, G., Rabin, M., 2002. Understanding social preferences with simple tests. *Quart. J. Econ.* 117, 817–869. <http://dx.doi.org/10.1162/00335302760193904>.
- Chernyak, N., Sobel, D.M., 2015. Equal but not always fair: value-laden sharing in preschool-aged children. *Soc. Dev.* 25, 340–351.
- Choshen-Hillel, S., Shaw, A., Caruso, E.M., 2015. Waste management: how reducing partiality can promote efficient resource allocation. *J. Person. Soc. Psychol.* 109, 210–231.
- Choshen-Hillel, S., Shaw, A., Caruso, E.M., 2018. Disadvantaged but not dissatisfied: agency improves workers' long-term satisfaction with unequal pay. *J. Exp. Psychol. Appl.* 24, 578–599.
- Choshen-Hillel, S., Yaniv, I., 2011. Agency and the construction of social preference: between inequality aversion and prosocial behavior. *J. Person. Soc. Psychol.* 101, 1253–1261.
- Choshen-Hillel, S., Yaniv, I., 2012. Social preferences shaped by conflicting motives: when enhancing social welfare creates unfavorable comparisons for the self. *Judgm. Decis. Mak.* 7, 618–627.
- Cook, K.S., Yamagishi, T., 2008. A defense of deception on scientific grounds. *Soc. Psychol. Quart.* 71, 215–221.
- Daves, C.T., Fowler, J.H., Johnson, T., McElreath, R., Smirnov, O., 2007. Egalitarian motives in humans. *Nature* 446, 794–796.
- DeJesus, J.M., Rhodes, M., Kinzler, K.D., 2014. Evaluations versus expectations: children's divergent beliefs about resource distribution. *Cognit. Sci.* 38, 178–193.
- Echelbarger, M., Gelman, S.A., 2017. The value of variety and scarcity across development. *J. Exp. Child Psychol.* 156, 43–61.
- Engelmann, D., Strobel, M., 2004. Inequality aversion, efficiency, and maximin preferences in simple distribution experiments. *Am. Econ. Rev.* 94, 857–869.
- Enright, R.D., Bjerstedt, A., Enright, W.F., Levy, V.M., Lapsley, D.K., Buss, R.R., ... Zindler, M., 1984. Distributive justice development: cross-cultural, contextual, and longitudinal evaluations. *Child Dev.* 55, 1737–1751.
- Enright, E.A., Gweon, H., Sommerville, J.A., 2017. To the victor go the spoils: infants expect resources to align with dominance structures. *Cognition* 164, 8–21.
- Fehr, E., Bernhard, H., Rockenbach, B., 2008. Egalitarianism in young children. *Nature* 454, 1079–1083.
- Gelfand, M.J., Raver, J.L., Nishii, L., Leslie, L.M., Lun, J., Lim, B.C., ... Aycan, Z., 2011. Differences between tight and loose cultures: a 33-nation study. *Science* 332, 1100–1104.
- Geraci, A., Surian, L., 2011. The developmental roots of fairness: infants' reactions to equal and unequal distributions of resources. *Dev. Sci.* 14, 1012–1020.
- Gordon-Hecker, T., Choshen-Hillel, S., Shalvi, S., Bereby-Meyer, Y., 2017a. Resource allocation decisions: when do we sacrifice efficiency in the name of equity? In: Li, M., Tracer, D. (Eds.) *Interdisciplinary Perspectives on Fairness, Equity and Justice*. Springer, NY, pp. 93–105.
- Gordon-Hecker, T., Rosensaft-Eshel, D., Pittarello, A., Shalvi, S., Bereby-Meyer, Y., 2017b. Not taking responsibility: equity trumps efficiency in allocation decisions. *J. Exp. Psychol. Gen.* 6, 771–775.
- Henrich, J., Heine, S.J., Norenzayan, A., 2010. The weirdest people in the world? *Behav. Brain Sci.* 33, 61–83.
- Hertwig, R., Ortmann, A., 2001. Experimental practices in economics: a methodological challenge for psychologists? *Behav. Brain Sci.* 24, 383–403.
- Hertwig, R., Ortmann, A., 2008. Deception in experiments: revisiting the arguments in its defense. *Ethics Behav.* 18, 59–92.
- Hofstede, G., Bond, M.H., 1988. The Confucius connection: from cultural roots to economic growth. *Organ. Dyn.* 16, 5–21.
- Hofstede, G.H., Hofstede, G.J., Minkov, M., 2010. *Cultures and Organizations: Software of the Mind*. McGraw-Hill, New York.
- Hook, J.G., Cook, T.D., 1979. Equity theory and the cognitive ability of children. *Psychol. Bull.* 86, 429–445.
- Johansson, L., Gustafsson, M., Olsson, L., Garling, T., 2007. Weighing third-party fairness, efficiency, and self-interest in resource allocation decisions. *J. Econ. Psychol.* 28, 53–68.
- Kenward, B., Dahl, M., 2011. Preschoolers distribute scarce resources according to the moral valence of recipients' previous actions. *Dev. Psychol.* 47, 1054–1064.

- Kleiman-Weiner, M., Shaw, A., Tenenbaum, J.B., 2017. Constructing social preferences from anticipated judgments: when impartial inequity is fair and why? In: Proceedings of the 39th Annual Conference of the Cognitive Science Society, London, UK. Cognitive Science Society, pp. 676–681.
- Kogut, T., 2012. Knowing what I should, doing what I want: from selfishness to inequity aversion in young children's sharing behavior. *J. Econ. Psychol.* 33, 226–236.
- Lieberman, Z., Shaw, A., 2017. Children use partial resource sharing as a cue to friendship. *J. Exp. Child Psychol.* 159, 96–109.
- Matania, E., Yaniv, I., 2007. Resource priority, fairness, and equality-efficiency compromises. *Soc. Justice Res.* 20, 497–510.
- McAuliffe, K., Blake, P.R., Kim, G., Wrangham, R.W., Warneken, F., 2013. Social influences on inequity aversion in children. *PLoS One* 8, e80966.
- McAuliffe, K., Blake, P.R., Steinbeis, N., Warneken, F., 2017. The developmental foundations of human fairness. *Nat. Hum. Behav.* 1, 1–9.
- McAuliffe, K., Blake, P.R., Warneken, F., 2014. Children reject inequity out of spite. *Biol. Lett.* 10, 20140743.
- McAuliffe, K., Jordan, J., Warneken, F., 2015. Costly third-party punishment in young children. *Cognition* 134, 1–10.
- Mitchell, G., Tetlock, P.E., Mellers, B.A., Ordóñez, L.D., 1993. Judgments of social justice: compromises between equality and efficiency. *J. Person. Soc. Psychol.* 65, 629–639.
- Moore, A., Taylor, M., 2010. Waste not, even if it's free: an experimental explanation for apparently unprofitable promotions. *Appl. Econ. Lett.* 17, 341–343.
- Mullainathan, S., Shafir, E., 2014. *Scarcity: Why having too Little Means So Much*. Picador, Henry Holt and Company, New York.
- Munroe, R.L., Munroe, R.H., 1977. Cooperation and competition among East African and American children. *J. Soc. Psychol.* 101, 145–146.
- Nelson, S.A., Dweck, C.S., 1977. Motivation and competence as determinants of young children's reward allocation. *Dev. Psychol.* 13, 192–197.
- Ng, R., Heyman, G.D., Barner, D., 2011. Collaboration promotes proportional reasoning about resource distribution in young children. *Dev. Psychol.* 47, 1230–1238.
- Nielsen, M., Haun, D., 2015. Why developmental psychology is incomplete without comparative and cross-cultural perspectives. *Philos. Trans. R. Society B* 371, 20150071.
- Okun, A.M., 1975. *Equality and Efficiency: The Big Tradeoff*. Brookings Institution Press, Washington, DC.
- Olson, K.R., Dunham, Y., Dweck, C.S., Spelke, E.S., Banaji, M.R., 2008. Judgments of the lucky across development and culture. *J. Person. Soc. Psychol.* 94, 757–776.
- Olson, K.R., Spelke, E.S., 2008. Foundations of cooperation in young children. *Cognition* 108, 222–231. doi:10.1016/j.cognition.2007.12.003.
- Oyserman, D., 2017. Culture three ways: culture and subcultures within countries. *Ann. Rev. Psychol.* 68, 435–463. doi:10.1146/annurev-psych-122414-033617.
- Paulus, M., 2015. Children's inequity aversion depends on culture: a cross-cultural comparison. *J. Exp. Child Psychol.* 132, 240–246. doi:10.1016/j.jecp.2014.12.007.
- Porter, L.W., Lawler, E.E., 1968. *Managerial Attitudes and Performance*. Irwin, Homewood.
- Renno, M.P., Shutts, K., 2015. Children's social category-based giving and its correlates: expectations and preferences. *Dev. Psychol.* 51, 533–543.
- Rizzo, M.T., Elenbaas, L., Cooley, S., Killen, M., 2016. Children's recognition of fairness and others' welfare in a resource allocation task: age related changes. *Dev. Psychol.* 52, 1307–1317.
- Rizzo, M.T., Killen, M., 2016. Children's understanding of equity in the context of inequality. *Br. J. Dev. Psychol.* 34, 569–581.
- Rochat, P., Dias, M.D., Liping, G., Broesch, T., Passos-Ferreira, C., Winning, A., Berg, B., 2009. Fairness in distributive justice by 3- and 5-year-olds across seven cultures. *J. Cross-Cult. Psychol.* 40, 416–442.
- Rossano, F., Rakoczy, H., Tomasello, M., 2011. Young children's understanding of violations of property rights. *Cognition* 121, 219–227.
- Sagiv, L., Schwartz, S.H., Arieli, S., 2010. Organizational values: individual and national perspective. In: Ashkenasy, N., Peterson, M., Wilderom, C. (Eds.), *Handbook of Organizational Culture and Climate*. Sage, Newbury Park, CA.
- Schmidt, M.F., Sommerville, J.A., 2011. Fairness expectations and altruistic sharing in 15-month-old human infants. *PLoS ONE* 6, e23223.
- Schmidt, M.F., Svetlova, M., Johé, J., Tomasello, M., 2016. Children's developing understanding of legitimate reasons for allocating resources unequally. *Cognit. Dev.* 37, 42–52. doi:10.1016/j.cogdev.2015.11.001.
- Schwartz, S.H., 2009. Culture matters: national value cultures, sources and consequences. In: Chiu, C.Y., Hong, Y.Y., Shavitt, S., Wyer, Jr., R.S. (Eds.), *Understanding Culture: Theory, Research, and Application*. Psychology Press, New York, pp. 127–150.
- Shaw, A., 2013. Beyond to share or not to share: the impartiality account of fairness. *Curr. Direct. Psychol. Sci.* 22, 413–417.
- Shaw, A., 2016. Fairness: what it isn't, what it is, and what it might be for. In: *Evolutionary Perspectives on Child Development and Education*. Springer International Publishing, pp. 193–214.
- Shaw, A., Choshen-Hillel, S., 2017. It's not fair: folk intuitions about disadvantageous and advantageous inequity aversion. *Judgm. Decis. Mak.* 12, 208–223.
- Shaw, A., Choshen-Hillel, S., Caruso, E.M., 2016. The development of inequity aversion: understanding when (and why) people give others the bigger piece of the pie. *Psychol. Sci.* 27, 1352–1359.
- Shaw, A., Descioli, P., Olson, K.R., 2012. Fairness versus favoritism in children. *Evol. Hum. Behav.* 33, 736–745. doi:10.1016/j.evolhumbehav.2012.06.001.
- Shaw, A., Montinari, N., Piovesan, M., Olson, K.R., Gino, F., Norton, M.I., 2014. Children develop a veil of fairness. *J. Exp. Psychol. Gen.* 143, 363–375. doi:10.1037/a0031247.
- Shaw, A., Olson, K.R., 2012. Children discard a resource to avoid inequity. *J. Exp. Psychol. Gen.* 141, 382–395. doi:10.1037/a0025907.
- Shaw, A., Olson, K.R., 2013. All inequality is not equal: children correct inequalities using resource value. *Front. Psychol.* 4. doi:10.3389/fpsyg.2013.00393.
- Shaw, A., Olson, K.R., 2014. Fairness as an aversion to partiality: the development of procedural justice. *J. Exp. Child Psychol.* 119, 40–53.
- Sheskin, M., Bloom, P., Wynn, K., 2014. Anti-equality: social comparison in young children. *Cognition* 130, 152–156.
- Sheskin, M., Nadal, A., Croom, A., Mayer, T., Nissel, J., Bloom, P., 2016. Some equalities are more equal than others: quality equality emerges later than numerical equality. *Child Dev.* 87, 1520–1528. doi:10.1111/cdev.12544.
- Sigelman, C.K., Waitzman, K.A., 1991. The development of distributive justice orientations: contextual influences on children's resource allocations. *Child Dev.* 62, 1367–1378.
- Sloane, S., Baillargeon, R., Premack, D., 2012. Do infants have a sense of fairness? *Psychol. Sci.* 23, 196–204.
- Steinbeis, N., Singer, T., 2013. The effects of social comparison on social emotions and behavior during childhood: the ontogeny of envy and Schadenfreude predicts developmental changes in equity-related decisions. *J. Exp. Child Psychol.* 115, 198–209.
- Sutter, M., Feri, F., Kocher, M.G., Martinsson, P., Nordblom, K., Rutzler, D., 2010. *Social Preferences in Childhood and Adolescence: A Large-Scale Experiment (IZA DP No. 5016)* Retrieved from EconStor, website: [https://www.econstor.eu/handle/10419/36912#? \(02/20/2018\)](https://www.econstor.eu/handle/10419/36912#? (02/20/2018)).
- Zhang, Z., Yang, C., 1998. Beyond distributive justice: the reasonableness norm in Chinese reward allocation. *Asian J. Soc. Psychol.* 1, 253–269.
- Zultan, R. (2015). Do participants believe the experimenter? Mimeo. Retrieved from: <http://www.bgu.ac.il/~zultan/>.