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Do sex and age affect strategic behavior and inequity aversion in children?



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ABSTRACT

The ultimatum game is commonly used to explore fairness in adults in bargaining situations. Although the changes in responses that occur during development have been investigated in children, the results have been mixed. Whereas some studies show that proposers offer more when they grow older, others indicate the opposite. Moreover, these studies are outcome-based and leave intentions out of the scene, although intentions play a relevant role in daily life. The mini-ultimatum game offers the opportunity to test both outcomes and intentions, but one major obstacle for accurately pinpointing developmental transitions in strategic behavior and inequity aversion so far has been the multiple confounds that have plagued previous studies, including different methods, small sample sizes, and reduced age differences. We administered an anonymous direct-method one-shot mini-ultimatum game to 478 6- and 10-year-old children. Strategic behavior was present at 10 years of age; older participants matched more accurately what responders would accept than younger participants. However, this was true only for older girls. No sex differences were detected in younger children. No age group seemed to consider the proposer's intentions given that the rejections of the default option were not significant across conditions. Both disadvantageous and advantageous inequity aversions were present in 6-year-olds. However, older children exhibited significantly more disadvantageous inequity aversion than younger children. This contrast made the pattern of rejection

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of 6-year-olds look more similar to the pattern of rejection found in adults. No sex differences were found in responders' behavior.

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Introduction

Fairness is an important consideration when interacting with others, particularly when resource distribution or the provision of services is involved. When sharing resources, fairness can be construed from a purely selfish perspective (the largest share for me). However, when reaching an agreement between donor and recipient is necessary, fairness for the donors should include their partners' outcomes (equal/similar for both), whereas fairness for the recipients should consider outcomes with the interplay of the donors' intentions (the best option available, although unequal for both) (Blake, McAuliffe, & Warneken, 2014; Falk & Fischbacher, 2006). Recent years have seen great interest in tracing the development of fairness in children, particularly in relation to strategic behavior (donors) and inequity aversion (recipients) (e.g., Blake et al., 2015; Camerer, 2003; Sally & Hill, 2006; Shaw & Olson, 2012).

From a donor's perspective, strategic thinking (i.e., making different offers depending on a recipient's options and social influence) can be beneficial from material (rewards) and social (reputation) perspectives. However, strategic thinking does require certain perspective-taking abilities to consider another person's view (Harbaugh, Krause, & Liday, 2003; Takagishi, Kameshima, Schug, Koizumi, & Yamagishi, 2010) and even the ability to incur some costs to close a deal. This means that the underlying concept of fairness should deviate from a purely selfish perspective to include some consideration of the partner's outcomes. Even though already at 3 years of age children understand others' desires (Rakoczy, Warneken, & Tomasello, 2007) and from 4 years onward are capable of incurring a cost in sharing games (Moore, 2009), strategic thinking seems to appear later in development, between 6 and 13 years of age (Harbaugh et al., 2003; Leman, Keller, Takezawa, & Gummerum, 2009; Steinbeis, Bernhardt, & Singer, 2012) or even later when donors need to extract information from the recipient's earlier choices (Harbaugh, Krause, & Vesterlund, 2007).

From a recipient's perspective, acceptance of non-zero offers are beneficial whereas rejection of offers that are considered too low can reduce both the appearance of weakness (reputation) and the promotion of future cooperation (Fehr & Fischbacher, 2003; Fehr & Gächter, 2000). Disadvantageous inequity aversion is defined as the willingness to sacrifice material payoffs for the sake of greater equality when the partner is obtaining more than oneself (Fehr & Schmidt, 1999). Infants expect equal distributions (Schmidt & Sommerville, 2011; Sloane, Baillargeon, & Premack, 2012) and show negative emotions when peers obtain more than they do (LoBue, Nishida, Chiong, DeLoache, & Haidt, 2011). Indeed, recent studies have shown that children from 4 years of age onward are willing to pay a cost to prevent others from receiving more than they receive (Blake & McAuliffe, 2011; Sheskin, Bloom, & Wynn, 2014) and may even act spitefully (McAuliffe, Blake, & Warneken, 2014; Sheskin et al., 2014). These rejections in one-shot games have been explained by a strong bias to social comparison, so that children seek a relative advantage over their partners at least until preadolescence (Blake et al., 2014). Interestingly, rejections can also be motivated by advantageous inequity aversion, that is, rejecting a better offer than the partner. In this case, however, it seems that this type of inequity aversion appears later in development (around 8 years of age; Blake & McAuliffe, 2011; McAuliffe et al., 2014) compared with disadvantageous inequity aversion.

Most of the studies mentioned earlier were outcome-based, thereby leaving the players' intentions out of the picture. Typically, the experimenter presented an unfair distribution to the participants and measured their responses. Thus, the underlying concept of fairness for the recipients could be based only on the partner's outcomes. Intentions, however, can play an important role in the donor's offer and the recipient's decision to accept or reject an offer. For example, in front of two unequal offers, recipients might not reject if they know that donors chose the one that reduced the inequality

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