Social Processes in Young Children's Developing Understanding of Fairness

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Declaration

I declare that this thesis is my own work, completed solely by the author under the

supervision of Professor Charlie Lewis and Dr. Jared Pizza, and that it has not been

submitted in substantially the same for the award of a higher degree elsewhere.

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List of Abbreviations

AI   Advantageous Inequality

DI   Disadvantageous Inequality

DD   Diverse Desires

EFB   Explicit False Belief

HE   Hidden Emotion

KA   Knowledge Access

ToM   Theory of Mind

UFad   Unfair Advantageous

UFdis Unfair Disadvantageous

UG   Ultimatum Game

Thesis Abstract

The ability to understand social norms serves as an important means by which young children navigate themselves through complex social interactions. How children learn and practice these norms, especially fairness, one of the key concepts of morality and a core foundation of our society, continues to be a hot topic in the literature within developmental psychology. Although the general ontogeny of moral development has been well documented, emerging evidence suggests complex social contextual information that qualifies the developmental and cultural variances in the development of understanding. However, the lack of systemic investigation of the complex social influences on children's fairness understanding is a pressing issue that needs to be addressed in the field. Therefore, this thesis sets out to explore how children from different age groups and cultural backgrounds understand, evaluate and apply fairness rules in their dynamic social interactions, in order to provide a more complete understanding of children's emerging grasp of fairness and the role of social context in achieving this.

The first study examined the interaction of six influences that have been shown to affect children's fairness allocations: three structural factors (age, gender and culture: the UK vs China) and three contextual manipulations (whether equal allocation incurred a cost whether a trial involved competition, or was with a friend or an unknown peer). The data suggest that we need to take into account the interactions between these variables and the paper develops a dynamic model to describe this complexity in children's fairness understanding. The statistical interactions revealed the complexity of social influences on children's fairness allocation, specifically older Chinese females were more likely to apply the fairness principle across different contexts than children in other age and cultural groups. At the same time whether being fair incurred a cost to the child was found to be important.

This influence was captured in a Dynamic Cost Model to account for how children balance of self-interest and principles of normativity.

The second study capitalised on the first study and looked beyond these behavioural data to further examine children's justifications of their allocations in order to identify the underlying principles that guided children's distributions. The diversity of children's justifications that was found in the second study provided clear and direct evidence to support our first study. Children's fairness considerations changed systematically in response to the context of the allocations.

The third study focused on one particular social factor, authority, that emerged frequently in children's responses when they allocated resources, to analyse how social norms are developed from simple imitation to the implementation of specific principles based on children's own understanding. The results from the third study suggest that despite the finding that more acceptance was given to an allocator with higher authority, children questioned an authority's legitimacy when they made unequal distributions. This was especially the case when they were treated disadvantageously: normative related thinking was provoked immediately.

Children's social understanding ability, often termed as social understanding or 'theory of mind (ToM)', influence children's fairness development informed the final research question of this thesis. An under-investigated age group, two-year-olds was included in the sample to assess children's judgements along with their emotional responses to three types of distribution (fair, advantageous and disadvantageous inequality) in relation to multiple aspects of ToM abilities. The fourth study reported a positive predictive effect of social understanding on children's fairness understanding, and that the emotional response

from young children was a meaningful indicator of their complex evaluations regarding fairness allocations.

The findings of this thesis suggest that social contexts heavily affect children's fairness understanding and behaviour. These provide a medium in which developmental stage and cultural background interact. Children's fairness development is the process of weighing self-interest and these dynamic social pressures.

Chapter 1: General Introduction

1.1 The Concept of Fairness

Determining whether millionaires should pay more taxes, or whether a crying child is entitled to stay on a swing longer than their peers, are examples of resource challenges that are faced every day, in which equality is not always an option, and this conflicts with efficiency of social interactions (Choshen-Hillel, Shaw, & Caruso, 2015; Hsu, Anen, & Quartz, 2008; Okun, 2015). This is where fairness arises and becomes a core foundation in maintaining social order. Fairness is a unique moral conception in human society. It is a distinctive feature to differentiate people from all other species, such as chimpanzees which are generally considered as the close kin to humans. Experimental research shows that adult chimpanzees allocate resources randomly without any fairness-concerns when facing a distribution game with others. They react to fair and unfair distributions similarly, although they tend to maximise their benefits (Jensen, Hare, Call, & Tomasello, 2006; Silk et al., 2007; Jensen et al., 2007; Vonk et al., 2008). In contrast, even human infants respond to fairness-related challenges sensitively (Geraci & Surian, 2011; Sloane, Baillargeon & Premack, 2012; Schmidt & Sommerville, 2011). In Admas's (1963) Equity Theory that was extended by Walser (1973, 1978), it is argued that a distributive fairness system is created to maximize society members' benefits by fairly dividing resources among them. It is postulated that through the long process of evolution, moral norms have been established to maintain the order of human society. Punishing the violators of a norm is essential for the maintenance of this stability. A preference for fairness is a keystone in building these norms (Fehr & Gächter, 2002; Yamagishi, 1986).

Research on fairness involved, in the last century, economists, philosophers, psychologists and many other researchers. They have attempted from different but complementary perspectives to explain its mechanism. However, fairness is a highly complex

conception, and it is assumed that perspectives across disciplines are more helpful. In recent decades, especially the last one, fairness has been considered as the centre of morality and social norms by psychologists (Decety & Wheatley, 2015), particular developmental psychologists, who attempt to understand the tendency towards fairness and its developmental trajectory, and they tend to adapt economic games as the vital method to study these questions (Tomasello & Vaish, 2013). The procedures employed in these games vary according to particular test questions and the developmental levels of the subjects under investigation. These variations will be discussed in the methodology section below and in each of the specific studies in later chapters. We will focus first on the three foundational theoretical questions that tend to be central within the developmental psychology field, which are:

1) do children have a sense of fairness?

2) if so, what is the trajectory of fairness?

3) how do children learn fairness and which principles do they follow in fairness events?

1.2 Research Focuses

We will start with a discussion of the first question: the existence of fairness in childhood. Despite variations in the methodology and age groups of studies, a consensus has been reached that inequity aversion, which refers to a tendency to dislike and correct unequal outcomes (Fehr & Schmidt, 1999, p. 819), is a common characteristic that we can reasonably expect from children. It is evident within a rich diversity of fairness research that has defined a developmental trajectory of fairness preference, although the debates on the timing of certain age milestones continues.

Studies with infants, as young as 12 months old, indicate that they show sensitivity to resources allocations (Schmidt & Sommerville, 2011). However, this development starts much earlier and can be traced back to 9 months old when the transitional period starts (Ziv

& Sommerville, 2017). This early sensitivity soon develops into preference for a fair distribution that takes account a range of situational demands. For example, 16-month-olds can evaluate an agent's distributive actions and prefer a fair allocation (Geraci & Surian, 2011). By 19 months old, infants start to expect resources to be divided equally (Sloane, Baillargeon & Premack, 2012). Twenty-five-month old infants initially allocate resources selfishly but when the recipients express their desires for candies, infants make a more fair division (Smith, Blake, & Harris, 2013; Sommerville, Schmidt, Yun, & Burns, 2012) and show more signs of prosocial behaviours, like instrumental helping, informational assistance, sharing, comforting or empathic helping, and altruism. (Eisenberg, Fabes & Spinrad, 2007; Rheingold, Hay, & West, 1976; Warneken & Tomasello, 2006; Zahn-Waxler, Radke-Yarrow, Wagner, & Chapman, 1992; Brownell, Svetlova & Nichols, 2009).

Following this fairness awareness that emerges in infancy and toddlerhood, 3- to 5-year-olds display a more complicated profile of their fairness development. Children at this age appear to be experiencing a difficult time, the so called 'The Knowledge-Behaviour Gap' (Blake, McAuliffe & Warneken, 2014), in which they show that young children are struggling with the opposing forces of selfishness or inequity aversion. These two tendencies seem to be in balance, and children fail to behave either fairly or selfishly across varieties of tasks (fair: e.g., Damon, 1975; Fehr et al., 2008; Gummerum et al., 2010; Hook & Cook, 1979; LoBue et al., 2011; McCrink et al., 2010; Rochat et al., 2009), (unfair: e.g., Olson & Spelke, 2008; Peterson et al., 1975; Thomson & Jones, 2005). Researchers hold different explanations for this mixed pattern - for example, that this reflects children's social-cognitive understanding (Engel, 2011; Vaish & Warneken, 2012; Takagishi et al., 2014) or numerical competence (Chernyak et al., 2016), but self-interest is generally regarded as a strong motivation for children to make unfair decisions when facing fairness judgements at this developmental stage (Blake & McAuliffe, 2011; Blake & Rand, 2010; Blake et al., 2014;

Sheskin et al., 2014). Indeed, even their aversion to inequality is influenced by their relative advantages. Children at this period are mainly sensitive to unfair allocations that disadvantage themselves and display a strong tendency to reject these inequalities (Blake & McAuliffe, 2011; LoBue, et al., 2011; McAuliffe et al., 2013; McAuliffe, Blake & Warneken, 2014; Takagishi et al., 2010; William & Moore, 2016).

During the preschool years, one of the significant developments is that children at this stage start to reject advantageous allocations (McAuliffe et al., 2017; McAuliffe, Blake & Warneken, 2014; William & Moore, 2014; Williams & Moore, 2016) and they can rely on contextual information to adjust their behaviours. Children who are older than 6 years start to demonstrate fairness behaviours that are generally agreed as a stable and adult-like understanding of fairness in various contexts (e.g., Damon, 1975; Enright et al., 1980; Fehr et al., 2008; Gummerum et al., 2010; Moore, 2009; Rochat et al., 2009; Thompson, Barresi, & Moore, 1997; Tsutsu, 2010; Ugurel-Semin, 1952).

Combining the above data and discussion, the research indicates clearly that children demonstrate a fairness preference at a very young age, although they behave unfairly in some situations. It also outlines a brief developmental path that highlights the key stages which transmit children into different understandings of fairness. Meanwhile, this trajectory impresses upon us the importance of understanding the mechanism behind its development in order to explain the variations in children's behaviours. For example, 3 years old children will allocate candies equally when there is no cost to them, but when maintaining equality requires a cost to them, their distribution becomes less fair (Blake et al., 2014). This simple manipulation that changes children's behaviour dramatically shows that children are sensitive to social influences in their allocations. Moreover, a cost to oneself is not the only influence on theory that has been proposed to explain children's fairness behaviours. Many other factors can also exert an influence. These include other social stimuli, the effects of various

individual differences and general issues in cognitive development, some of which will be the focus of the studies in this thesis.

How resources are allocated, who children share the resources with and whether the distribution involves a competition are social stimuli that are most focused in assessments of fairness allocation. As discussed above, children are less likely to uphold fairness when there is a cost to themselves involved. When the discrepancy of the rewards ratio increases, for example when the division of spoils shifts from 1: 2 to 1:5, the cost effect becomes even stronger (Williams & Moore, 2014). When allocating resources with a friend, children act more fairly, but not with a nonfriend. Their attitude changes again when a stranger appears, and they treat strangers more prosaically (Moore, 2009). The inclusion of competition also changes children's allocations, in which they make fewer fair allocations when involved in a competitive task (Pappert, Williams & Moore, 2016).

Moreover, individual differences, such as gender and cultural variations interact with developmental ones which are signified by age differences. Harbaugh (2003) argues that children's understanding and preference of fairness develop considerably with age and the above discussion of the trajectory has well documented its changes. The child's cultural background is another factor that appears to provide significant influence. Children from different countries clearly demonstrate different developmental paths. For example, one study showed that across seven cultures all participants developed disadvantageous inequity aversion by middle childhood, but only children from Canada, Uganda and USA were able to reject advantageous allocation around age 10 (Blake, 2015). Children's allocation behaviours also reflect their cultural characteristics. Those from individualistic cultures appear to place less emphasis on equality, while their peers in collectivistic societies adhere to stricter fair allocations (Henrich et al., 2005; Oosterbeek et al., 2004). Gender differences have also been

identified to play a role in children's allocation. Generally, females are considered to be more fair, and girls have been found to share more rewards than boys do (Birch & Billman, 1986).

Furthermore, cognitive ability is another factor that often affects children's behaviours in the games. Theory of Mind (ToM), which sometimes is termed as social understanding (Carpendale & Lewis, 2015), has been reported to facilitate children's fairness (Mulvey, Buchheister, & McGrath, 2016; Takagishi et al., 2010). However, the literatures described above only report the most studied effects of these factors. There is considerable amount of empirical data that proposes significant variations in children's performance, even producing what appear to be opposite influences of these factors (Lucas, Wagner & Chow, 2008; Mulvey, Buchheister & McGrath, 2016; Sally & Hill, 2006; Takagishi et al.,2010). The potential interactions among them are under-researched and will be discussed in the papers to be presented in the following chapters.

This thesis will attempt to capitalise on the great diversity of factors that affect children's fairness understandings that are indicated collectively by the above studies. In keeping with other research in this area it will also attempt to identify the critical stages in children's emerging understanding of fairness that leads into a broader moral system. This project will focus on the age window, 2.5 to 7 years old, to systematically investigate how children from different cultural backgrounds, namely China and the UK, shape their fairness behaviours in various social contexts. This will not only add more evidence to identify a clear trajectory of fairness but also provide insight on fairness principles to reveal the learning process involved in acts involving or neglecting fairness.

1.3 Methodology

One significant difficulty for us in summarizing the results of previous research is the very differentiation of the phenomenon in all its aspects. For example, the design and the

procedure of tasks, the stories and context they expose the children to, the characteristics and abilities of the children etc. must all be considered. Any manipulation of these factors influences the results significantly as children perceive the task differently. Therefore, how to assess children's fairness judgement is critical to investigate children's fairness understanding.

1.3.1 Economics Games

The most popular methods used in the field are adopted from economics paradigms: the Dictator Game (Forsythe et al., 1994; Kahneman et al., 1986) and the Ultimatum Game (Güth, Schmittberger & Schwarze, 1982). In the Dictator Game, one party (the distributor) has the right to decide how to split the resources between themself and a recipient. The recipient can only accept the distribution. In an Ultimatum Game, the distributor still entitles the right to make the distribution freely, but the recipient also plays an active role to either accept or reject the distribution. If the recipient accepts, both parties get their resources as proposed by the distributor. If they reject, neither parties receive anything. The distributor usually offers 20-30% of the resources to the recipient in the dictator game and the ratio increases to 40% in the ultimatum game, despite the researcher normally representing a model offer of 0% or 50% (Camerer, 2003; Henrich et al., 2005). Given the low offer proposed by children, these data may lead to an underestimation of children's fairness understanding.

1.3.2 Limitation of Economic Paradigm

However, these games may not necessarily test fairness exclusively, but involves some other concepts instead or as well. In dictator games, there is no requirement for the distributor to give any rewards to the recipient and, if they do so, there is a sacrifice to themselves for giving up their own benefits to others. Therefore, the main conflict is between the interests of the self vs the other, and this usually involves a measurement of participants'

altruistic tendency and generosity (Bolton & Ockenfels, 2000; Fehr & Schmidt, 1999). As for the Ultimatum Game, these is a force that drives children to not only to consider the benefits for themselves but also the response of the recipients in case a rejection is made. Hence, the assessment is also not purely of the child's grasp of fairness, it involves reciprocity and more complex skills, like perspective taking and strategic thinking (Lucas, Wagner & Chow, 2008; Tsoi & McAuliffe, 2020). These concepts can be related closely to fairness but difficulties in separating them out remain.

1.3.3 Inequality Game

Moreover, there is a practical difference between understanding the concept of fairness and ensuring the principle is implemented correctly. Understanding this difference plays a pivotal role in examining children's fairness development. Children's poor performance in the Dictator and Ultimatum Games is not necessarily conclusive evidence to identify their fairness development as they are required actively to make fair allocations. These games are especially demanding for young children who are mainly self-interest oriented (Sanfey et al., 2003). For example, when five-year-old children are asked to play the Ultimatum Game, whatever their role assigned by the experimenter (either deciders or receivers), they are highly like to assign the first item or a more attractive item into their own place (Gummerum et al., 2010). However, when children are tasked to make judgments about allocations, they behave more fairly. Blake and McAuliffe (2011) developed an Inequity Game that presents children with predefined allocations and children only need to accept or reject them. This paradigm is widely used in testing children's inequity aversions and provides direct evidence to support children's fairness understanding. Results show that they will protest about unfair allocations at an earlier age that is not found using other procedures. For example, even as young as three years old, children are sensitive disadvantageous inequalities and reject these offers (LoBue et al., 2010; Takagishi et al., 2010). This suggests

that reacting to predefined allocations is a better method in assessing the abilities of young children as they may have fully understood what fairness is and make fair judgements, but it is not necessary for them to demonstrate fairness distributions at the same time. The latter accomplishment develops simultaneously with the acquisition of more cognitive and emotional resources (DeScioli, 2016; Gummerum et al., 2010) and occurs a few years later, when the understanding of fairness gradually becomes more stable and more consistent, after children passed their seventh or eighth birthdays (Blake & McAuliffe, 2011; Fehr, Bernhard, & Rockenbach, 2008; Shaw & Olson, 2012).

1.3.4 A New Approach

However, one potential limitation of the inequality game is that unfair allocations are typically presented in sequence, so children's responses are constrained to a certain extent. For example, participants first select a fair or advantageous allocation and, in the next trial, they appear to experience a challenge between a fair and disadvantageous allocation (Blake & McAuliffe, 2011). In this example, advantageous and disadvantageous allocations are never presented in the same trial. Hence, children do not have the chance to make a full range of decisions when making allocations in a single trial. Therefore, we set out to build on this design and present children with all three allocation possibilities to obtain the full picture of their fairness judgement. Meanwhile, researchers have mainly focused on children's fairness judgments, but little data is usually recorded on children's fairness justifications. Justification measurement is barely used in recent fairness research and yet it has been evident to provide valuable insights on children's fairness understanding (LoBue et al., 2011; Smith, Blake & Harris, 2012; Sigelman & Waitzman, 1991). Therefore, apart from the direct behavioural measure of fairness, we also want to include children's justifications to their judgements to discover their reasoning behind their action in order to explore the principles they follow in making farness judgements.

1.4 Cultural Comparison Background

All participants in the following studies are typically developing children who were recruited from largely working-class areas: a kindergarten in a country-level small city of China (Population = 729,300) (China's Seventh National Population Census, 2020) and 9 preschools and primary schools in a small city in the UK (Population = 146,038) (Office for National Statistics, 2021). They are comparable in terms of demographics, socioeconomic status and schooling experience in their own cultural backgrounds. Both cities are located in the north part of each country and are slightly below the mean of national income averages. In 2020, individual Gross Disposable Household Income (GDHI) in Lancaster was GBP16,355, 15.8% lower than the UK average (GBP 19,424). GDHI per head in Dengfeng, China was RMB 24, 810 compared to a national average of CNY32, 189, which fell 22.9% below the national average. All schools are located in major work-class neighbourhoods with children attending those that were close to their homes.

All children were attending their early years education at the time of testing. Early years education in UK is managed under The Early Years Foundation Stage (EYFS). EYFS provides education from all children under age 5 in two different settings. Children start their preschools in the September after their third birthday. After that, 4- to 5-year-olds attend a primary school and enrol to the Reception Year. Chinese early childhood education covers the period from birth to age of 6 with 2-year-olds start to attend a kindergarten. There are normally three year groups in a Chinese kindergarten: Junior Class for 3- to 4-year-olds, Middle Class for 4- to 5-year-olds and Senior Class for 5- to 6-year-olds.

The two countries show clear cultural differences with distinctive structures, of which UK is an individualist society and China is a collectivist country. I will discuss each cultural style in more detail in each chapter regarding its specific research focus, and will provide a brief profile of these difference here to set up the basic understandings. According to The

Inglehart-Welzel World Cultural Map -Word Values Survey 7 (2020), compared to individualist culture, loving and respect one's parents regardless of their behaviours and making their parents proud are the core concepts of family values within collectivist cultures. While social conformity outweighs individualistic striving, authority is also highly regarded.

All the children in the first study (reported in Chapter 1) were initially screened for colour blindness, identifying the colour of three different crayons (red, green and brown). These three colours were required for the colouring game. Red was the main colour of an apple and a strawberry. The green and brown were for the small elements, such as the leaf and stem. All the participants passed the screening successfully.

1.5 Conclusion

In the studies that comprise this thesis, the objective is to extend theory and method in the area in three ways. First, the theoretical aim is to explore the nature of theoretical shifts in 2.5-7 year olds' understanding of fairness concepts, by examining them within a wider range of social influences that have been identified before. As Paper 1 will suggest, research on social influences has been slightly piecemeal and the aim is to study several possible factors and their interactions. Secondly, the studies attempt to push methodological boundaries by examining different types of response made by children, including not only trials in which their choices are wider than has been studied but also the justifications that they make for their decisions. To do this the thesis aims, thirdly, to capitalise in the recent moves to make multivariate statistical procedures more available and useable, within the statistics package R, to enable more complex analyses of the various factors that contribute to the child's developing grasp of fairness.

Chapter 2: The Cost of Fairness

The Cost of Fairness: A Dynamic Model of Developmental Stage, Competition and Relation in British and Chinese Preschoolers' Resource Allocations

Research Highlights

- We examine several factors known to affect children's fairness allocations in relation to one another.

- We devised a means of allocating, within the same trial, equal rewards to themselves and another, or giving one more and the other fewer items.

- We analysed equal, advantageous and disadvantageous resource allocations from 204 3-7-year-old British and Chinese children who were presented with three manipulations simultaneously.

- Children's fairness allocation is best explained by a dynamic model with a central role of cost mediates other social influences.

Keywords

Fairness Development, Resource Allocation; Prosocial Behaviour; Economic Games; Cultural Comparisons; Bayesian Multinomial Modelling

2.1 Abstract

Several recent studies have examined the factors which influence children's fair distributions of resource, notably when sharing equally becomes costly, when they are competing with one another and whether or not the recipient is a friend. Yet few analyses of these influences have been conducted in relation to each other. This study compared 104 three-five-year-olds with 100 six-seven-year-olds' allocations of rewards within repeated trials in which three structural factors (age, gender and culture: the UK vs China) and three contextual manipulations (whether equal allocation incurred a cost whether a trial involved competition, or was with a friend or an unknown peer) were examined together. Bayesian multinomial modelling revealed a complexity of interactions between the factors, with the cost of losing part of the reward as the central factor influencing whether or not to divide resources equally, to favour oneself or to be generous to the other child. We explain a series of interactions. For example, older Chinese females were more likely to apply the fairness principle across different contexts. Similarly, children advantaged themselves more often when they were competing with a friend and when being fair earned them fewer rewards. A dynamic cost model is proposed to account for developmental processes in which children's growing sense of fairness consists of a balance between competing influences which collectively persuade the child to make equal, selfish or selfless allocations.

2.2 Introduction

Fairness, as a unique moral construct, has been widely investigated by economists, philosophers, anthropologists, psychologists and others (DeJesus et al., 2014; Gummerum et al., 2008; Kajanus et al., 2019). By manipulating the quality and quantity of the tokens being distributed in different scenarios, research has shown that children's allocations of resources are influenced by their developmental stage and cultural background (Blake et al, 2015), gender (Croson & Gneezy, 2009), the cost to the participant of losing items (Williams & Moore, 2014), and the particular social context, like whom they are sharing with (Moore, 2009), or whether an activity involves competition (Pappert et al., 2017). These effects have largely been examined individually. This may give the impression that they operate separately from each other – as depicted in what might be termed an Independence Model (the left panel in Figure 1). However, increasing recent evidence suggests that pairs of these individual factors interact. In this paper, we examine further three identified structural factors (developmental change, culture and gender), known to modify resource allocation, and three task specific variations, notably contextual influences like whether an allocation incurs a cost to the individual, involves competition or includes a friend or an unknown peer. While two-way interactions between these influences have been identified, we test the hypothesis that they need to be examined in relation to one another if we are to provide a more complete understanding of children's emerging grasp of fairness in how they allocate resources.

Although the factors identified in the 'Independence Model' have largely been examined individually, the evidence to date may be more appropriately summarised by the Interactive Model depicted in the right panel in Figure 1. This identifies fairness allocation as a product of pairs of factors simultaneously influencing resource distribution. However, this 'model' is simply abstracted from the existing studies which examine only two factors simultaneously, and these have not been fully tested nor developed within a more holistic

theoretical perspective. This Interactive Model seems more powerful than the Independence

Model, but it may not depict the extent or nature of the interactions between these factors and

what drives them. This study sets out to construct a model of how known social factors affect

fairness in different populations: whether allocations based on fairness are indeed the

outcome of these single effects or are affected by multiple factors systematically ordered

across two distinct populations.

Figure 1

Two Models of Resource Allocation
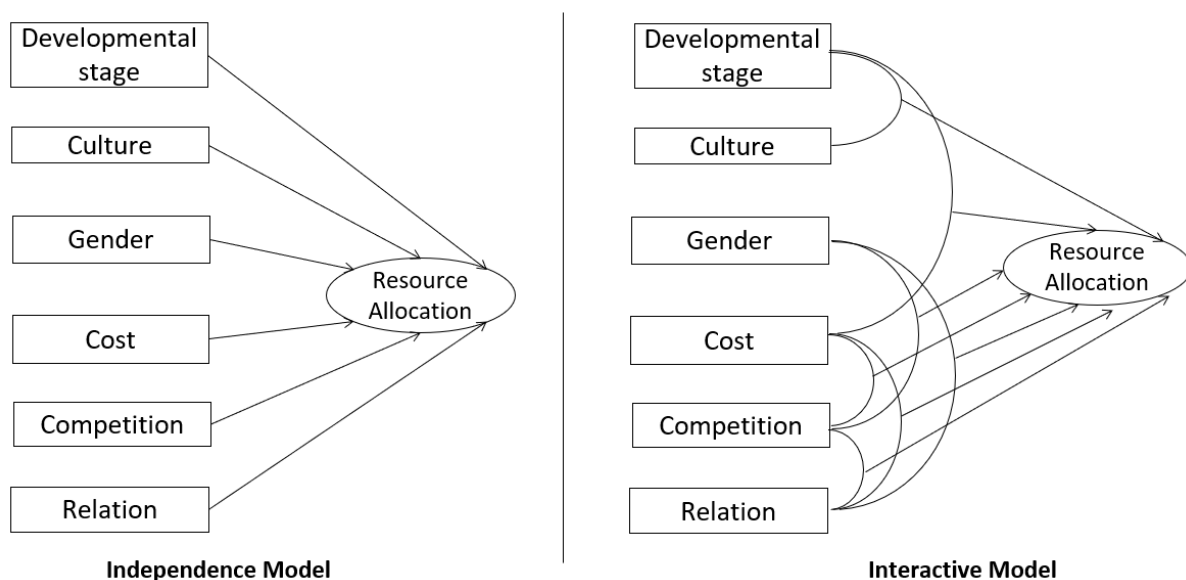
Note. The curves in the Interactive Model indicate interactions between pairs of variables that are referred to in the text.

2.2.1 Three Interacting Structural Factors: Age, Gender and Culture

Age A sensitivity to fairness seems to develop through infancy (Sloane et al., 2012;

Smith et al., 2013; Sommerville et al., 2013), but 3- to 5-year-olds struggle to align knowing

what is the expected of them and act fairly. Some studies suggest that preschoolers tend to

divide resources equally (e.g., Damon, 1975; Hook & Cook, 1979; McCrink et al., 2010;

Rochat et al., 2009), while selfish allocations are also reported (Olson & Spelke, 2008;

Peterson et al., 1975; Thomson & Jones, 2005). This knowledge-behaviour gap (Blake, 2018;

Blake et al., 2014) suggests that the late preschool years are critical for forming and enacting profound fairness principles. From age six, children start to reject advantageous allocations (Williams & Moore, 2016) and show a more adult-like understanding of fairness (Fehr et al., 2008; Gummerum et al., 2010). Thus, there seems to be a key transition between 5 and 6 years. Although age is normally assessed as a continuous variable in this research, we recruited two age groups of children who were 38 to 62 months old and 63 to 82 respectively. This allows us to compare key differences in children's use of these principles in two developmental groups in their performance on allocation tasks.

Gender Such developmental factors operate alongside gender differences. Females have been found to have a strong inequality aversion (Güth et al., 2007) and, in resource distribution tasks, are more likely to make equal allocation than males (Andreoni & Vesterlund, 2001; Bolton & Katok, 1995; Eckel & Grossman, 1998; Dickinson &Tiefenthaler, 2002; Selten & Ockenfels,1998). In helping and donating studies within behavioural economics, women give more resources to others than men do (Lee & Chang, 2007; Reed & Selbee, 2002). However, such sacrifice is not always in evidence. When the task simply involves allocating resources, many studies find no gender effects (Blake & McAuliffe, 2011; Hayashi, 2019; Huppert et al., 2018; Shaw & Olson, 2012), particularly when the recipients of allocations are fully anonymized (Bolton & Katok, 1995; Dufwenberg & Muren, 2006). Such conflicting findings may arise because females are more sensitive to whom they are sharing with (Croson & Gneezy, 2009). For example, females are more likely to abandon the fairness preference towards other women (Ben-Ner et al, 2004). This bias has been found in 8-10-year-old girls who offer more sweets to male recipients than to other females (Houser & Schunk, 2009). We further explore whether preschool girls will treat an unknown peer more fairly than they will a friend. As females are reported to be more sensitive to circumstantial influences, we test whether in the more socially complex

experience of competition the prosociality in girls will survive. The pressure to compete with others may result in them acting less fairly.

Culture The above studies were conducted mostly with participants from the US (e.g. Blake's work) and Canada (e.g. Moore's research), which are typical individualist cultures. Experimental analyses in the 1980s support the claim that the people with different cultural ideologies, particularly along the individualism – collectivism continuum, behave differently when making distributions based on different values that they uphold. While we need more evidence from children in collectivist cultures, we know from one major comparison that children from the USA and Canada (individualist cultures) tend to reject disadvantageous inequality at a younger age than do children from Peru, Senegal, Uganda and, particularly, Mexico. Indeed, the rejection of advantageous inequality only emerged in Canada and the USA, and not the other cultures, after the age of 10 (Blake et al., 2015). However, an older literature suggests that the pattern in China is different. For example, Leung and Bond (1984) found that Chinese university students followed norms more closely and regarded equal distributions as fair, more than did American students, irrespective of whether a peer was an out- or in-group member. These Chinese participants displayed greater respect of fairness in both realistic and hypothetical contexts, and in allocation trials involving low or high contributions by recipients. Within the same culture, 8 years old children reject both disadvantageous and advantageous allocations of resources more than equal ones (Kajanus et al., 2019). Even 3- 5-year-old Chinese children also demonstrate less self-interested behaviours in allocation tasks compared to American preschoolers (Rochat et al., 2009). Clearly there is a need to study such developmental trajectories in different cultures. We selected one individualist society (the UK) and China as a collectivist culture to examine whether a commitment to fairness emerges earlier in China.

2.2.2 Three Interacting Contextual Influences: Cost, Relation and Competition

Cost It has long been known that allocations of equal rewards are influenced by a range of factors. The most studied of these is the issue of personal gain or loss and is tested in the difference between 'cost' and 'non-cost' trials in allocation tasks. Several researchers have shown that when a fair distribution incurs a cost to the participant's interest, young children are significantly less likely to act fairly (Fehr et al, 2008; Thompson, 1997; Williams & Moore, 2014). The effect changes with the discrepancy between two allocations, one equal the other unequal, with larger ratios (e.g., 1:1 vs 1:5) provoking stronger cost effects (Williams & Moore, 2014). Such allocations are influenced by the contextual setting. For example, when they are informed that some recipients are in need of help, children are more tolerant towards those who had not helped needy recipients when the cost to themselves is higher (Sierksma, 2014). While most 7- to 8-year-olds are keen to uphold fairness regardless of the cost of this action (Fehr et al, 2008), a self-interest bias has been suggested as the fundamental challenge for 3-6-year-olds to overcome (Blake & McAuliffe, 2011). This occurs when allocating items to a competitor (Pappert et al., 2017) or to a friend rather than to a stranger (Moore, 2009). Given that the cost of a trial has less effect on older children, we expect that preschoolers will be more selfish in competitive contexts, especially when a fair allocation is costly. Regarding the allocation to different recipients, children may still behave fairly with a friend, even it is costly to be fair (Moore, 2009; Sparks et al., 2017).

Relationship Secondly, the relationship between the distributor and the recipient may influence children's allocations. For example, even 1.5 year olds look significantly longer at events that involve equal allocations or favour out-group members than those favouring in-group members. Thus, toddlers may expect an in-group member to gain more items (Bian et al., 2018). This in-group preference continues to develop and shows strong influences on older children's fairness judgements. Four- to six-year-olds can be less generous towards out-

group members (Fehr et al, 2008). Similarly, Moore (2009) found that 4.5- to 6-year-olds treated their friends more fairly even when there was a cost, but were more prosocial with a stranger when the allocation was not costly. So, preschoolers do not simply follow the rule of being more generous to members of the in-group and they are sensitive to the recipient's characteristics.

However, these results need to be taken with caution as children's affiliation with the recipient interacts with other factors. In-group and out-group members are defined by their common group identifications. For example, 4- to 7-year-olds favour children who are the same race (Clark et al., 1980), same gender (Yee & Brown, 1994), same nationality (Lambert & Klineberg, 1969) or speak the same language (Powlishta et al., 1994) as they do. More typically comparisons between a 'friend' and a 'stranger' are usually assessed by their interpersonal closeness. Children make fewer generous allocations to recipients who dislike their interests than recipients who shared their interests, or are neutral about them (Sparks et al., 2017). Hence, the distinctions made between different types of relationship (e.g., ingroup vs. outgroup or friend vs. stranger) may be too vague and their definitions usually overlap. For example, a familiar in-group member, like a classmate, may not necessarily be a good friend. Alternatively, a close friend like a playmate in the park may not count as an in-group member. Issues of affection and shared interests have a bearing on the allocation of resources. Evidence gathered from different studies are then made difficult to compare when they employ different paradigms: friend-stranger vs ingroup-outgroup. Therefore, we combined these two sets of factors by comparing a friend recipient as 'your best friend in your class' with a stranger, as 'a child who you do not know from another town'. This was in order to find a clear pattern for the relation effect on fairness: is there is a simple in-group member-bias, or does favouritism to a close friend lead a child to allocate resources differently to different recipients?

Competition A third dynamic influence is competition. When children compete for resources, this decreases their generosity regardless of the relevance of the resources to distribute (Sheskin, et al., 2014; Yip & Kelly, 2013). Even four- to six-year-olds become less prosocial in a competitive condition (Pappert et al., 2017). This suggests that when the other party gains more resources than the self, envy may be engendered by the social comparison, and such feelings may lead children to make fewer egalitarian decisions where they can (Shaw & Olson, 2012). Preschoolers often confront peers if resources are shared unequally (Scott & Cogburn, 2018). When fairness and favouritism are in conflict, interactants are often split over whom they prefer, even at the cost of fairness (Shaw et al., 2012). To what extent children favour their friend is not completely clear. Indeed, closeness magnifies social comparison concerns and may enhance competitive behaviours (Tesser et al., 1988; Tesser & Campbell, 1982; Tesser & Smith, 1980). A close friend's success is more threatening than a stranger's. Three- to six-year-olds appear to show self-interest in allocation tasks, but they also show a bias towards a friend (Zuckerman & Jost, 2001). This study will test whether, at this age, children simply prioritize their own gain before making a gesture of friendship when the trial involves a competition.

2.2.3 Methodological Approaches to Fairness Allocations

Fairness is normally examined by presenting participants with either equal or unequal allocations, using the Dictator Game (Gummerum et al., 2010), the Ultimatum Game (Wittig et al., 2013) or a forced choice selection task where participants are presented with allocations predefined by the researchers and their only task is to accept or reject each offer (Moore, 2009), or select their preferred allocations (Pappert et al., 2017). In these approaches children's fairness preferences are constrained, and the results may not reflect the full range of participants' preferences for particular allocations in particular circumstances. In addition, researchers normally present the two forms of inequality in sequence. Advantageous and

disadvantageous allocations have not been presented in the same trial. As a result, one third of possible allocations cannot be tested in each. We wished to explore how children allocate resources when they can advantage themselves, their partner or share rewards equally in the same trial.

Given these three allocation possibilities, the second goal of this study is to utilise a relatively new statistical approach to construct a model of the relative influences on resource allocation of the six factors (age, country, gender, cost, competition and relation) described above and their interactions. The aim is to take the literature beyond the Interactive Model discussed above and to fully explore the complexity among these factors. In addition to previous experimental paradigms, we will compare fair shares not only with a selection in which the participant gains, but also allocations in which they give more to their partner. This allows us to examine children's own allocations – in some trials we anticipated that they would be generous to the other interactant – and apply a statistical approach that enables us to compare three types of allocations that are: equal, advantage oneself, or disadvantage oneself.

2.3 Method

2.3.1 Participants

204 typically developing children were recruited from largely blue-collar areas: a kindergarten in a small city in China and 2 preschools and 4 primary schools in a small city in the UK. The sample included 108 younger children, 54 British (30 male) and 54 Chinese (35 male), range 3 years and 2 months to 5 years and 2 months, M=53 months, SD= 5.38, plus 96 older children, 46 (27 male) British and 50 (25 male). Chinese, range 5 years and 3 months to 6 years and 10 months, M=72 months, SD= 4.35. In both cultures all younger children were in different year groups to the older ones. The study was approved by the Faculty of Science and Technology's Ethics Committee at Lancaster University. Consent was obtained from parents and teachers prior to testing. Children's own willingness was also respected.

2.3.2 Materials and Design

The experimental stimuli were pairs of line drawings to the same fruit (e.g. a strawberry) one black and white, the other filled with three appropriate colours. These were presented on an iPad, using the online survey platform, Qualtrics. The child then selected pictures of wax crayons, which matched the colours of the drawings, to allocate.

In a mixed design, three between participants variables were used: country, age group and gender, depicted on the left of Table 1. Each group (n=25) was tested on eight trials in which there were three manipulations, each with two levels (see the right half of Table 1): cost and relation were randomised, while competition was counterbalanced.

Table 1

Study Design

Between Participants Factors			Repeated Measures			
Age Group	Country	Gender	Trial	Cost	Competition	Relation
Older	CN	F	1	Cost	Competition	Friend
		M	2			Unknown Peer
	UK	F	3		NOcompetition	Friend
		M	4			Unknown Peer
Younger	CN	F	5	NOcost	Competition	Friend
		M	6			Unknown Peer
	UK	F	7		NOcompetition	Friend
		M	8			Unknown Peer

2.3.3 Procedure

Testing took place in a quiet area of the classroom, normally the book corner. The participant sat next to the researcher at a table facing the iPad. Participants were first familiarized in one trial of the task and given clarification if there was any confusion in what it involved. They were shown how to make allocations, either to divide the crayons equally or to advantage one or other participant - specifically, how they would receive one allocation and the rest would go to the other participant. As a practice, all children completed the trial independently and followed the procedures correctly.

In the competition trials the participant was informed either that their teacher will praise the child who colours the best picture, while in free play (labelled NOcompetition trails) all the pictures will be used simply to decorate the researcher's drab office wall (in each case a picture of a teacher praising a child and a dull office were shown to the child). For the friend condition, children were asked to nominate their best friend in the class, while in the unknown peer trials the child was told that they were performing the task with a same sex peer from another nursery/school.

At the beginning of each allocation task, children were reminded about the trial (e.g., a competition with a friend). The participant was presented with drawings of two sets of crayons to distribute between themselves and the partner in each of the two types of trials depicted in Figure 2: either panel A (Cost) or panel B (NOcost). In panel A, one circle contained an unequal distribution (3:1) while the other had two identical pairs of crayons (2:2). Thus, in these cost trials the child had to decide between allocating both participants two crayons, versus one participant obtaining three crayons and the other only one in the unequal distributions. Panel B shows the NOcost trials, where the equal distribution of three crayons each (3:3) compared with a trial in which the better off beneficiary also received three crayons (3:1). Once the child selected one of the two groups of crayons to distribute, or

the circle in which they were placed, they were asked which group of crayons they would like to give to themselves and their partner and to explain why they had made this allocation. More crayons were provided for fair allocations in the NOcost trials than in the cost trials. While in cost trails, there were two fewer crayons to allocate and both children would missed out on one colour. After each trial the child was asked to explain their division of resources. Their explanations were coded separately and are not discussed here.

Figure 2

The Crayon Allocation Task
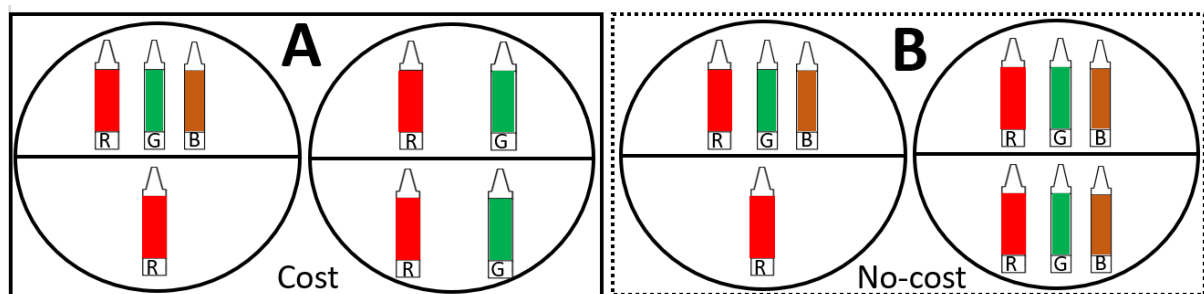
Note. The costly (**A**) and the no-cost (**B**) conditions. Only one of these two conditions is presented in each trial. Each includes an unequal allocation (left circle) and an equal allocation (right circle). In each trial, children first decide on which group of crayons (left or the right circle) they wish to distribute. If the children selected the left circle, they then allocated the crayons (top or bottom of the circle) to themselves and their partner.

2.4 Results

2.4.1 Statistical Design and Modelling

All essential details of the modelling process and the full results are published on the Open Science Framework (OSF) and the full access can be found online via: https://osf.io/phwfb/?view_only=3e97590d78e84e38afde92e42b26bd3c. As Table 2 shows, there were six explanatory variables of children's allocations; three structural factors (Age, Country and Gender) and three dynamic factors: Cost, Competition and Relation. The aim was to find the best fitting model of the six factors and their interactions on children's allocations. Given that children make two decisions in each trial, two logistic regression models were conducted in a preliminary analysis.

Table 2

Overview of the Variables: Categories and Descriptions

Category	Variable	Description
Demographic Information	Age	**Older:** Children aged between 60-79 months; **Younger:** Children aged between 38-60 months;
	Country	**CN:** participants from China; **UK:** participants from the UK;
	Gender	**Female** **Male**
Predictors	Cost	**Cost**: Participants face the distribution of 3:1 vs 2:2 so being fair is costly for the participants; **NOcost**: Participants face the distribution of 3:1 vs 3:3 so being fair is non-costly for the participants;
	Competition	**Competition:** Participants are asked to colour the best picture; **NOcompetition:** Participants simply colour the picture for decoration;
	Relation	**Friend**: Participants play the colouring game with a named friend; **Unknown Peer:** Participants play the colouring game with an unknown peer from 'another school'
Responses	Allocation	**Advantage-self:** participants select the distribution of 3:1 and allocate 3 items to themselves and 1 to the other; **Fair**: participants choose the distribution of 3:3(in costly condition) or 2:2(in costly condition) to behave fairly; **Disadvantage-self**: participants select the distribution of 3:1 and allocate 1 item to themselves and 3 to the other.

Note. The underlined level is the baseline for each variable.

The first one analysed children's fairness responses (making 'fair' vs 'unfair' allocations) in response to selecting which set of crayons to distribute. This produced complex interactions in predicting children's fairness judgement. The second model, examining the 'unfair' distributions – to allocate more crayons to oneself or the recipient, showed similar dynamic interactions among the explanatory variables. However, this preliminary procedure did not allow us to discriminate between selfish and selfless 'unfair' distributions, and two sets of results were consistent with those reported in the main analysis.

We report a multinomial multilevel logistic regression that enables us to compare the three types of allocations simultaneously within the full data set to find the best fitting model. This model employed the *brms* package in R, and the *Stan* platform to run full Bayesian inference (Bürkner, 2017). Default priors were used for two reasons: first, model diagnosis indicated that these were vague enough to avoid any substantial effects on the model and allowed the dataset to be converted well; secondly, to the best of our knowledge, there were no solid grounds from previous research on higher order interactions available for us to consider more specific priors.

Six models (see full description in the supplementary document on OSF) were computed using the bottom-up approach: starting with the simplest (Model 1) with only the main effect of each variable, then the following models added interactions from 2-way (Model 2) up to 6-way (Model 6) interactions. All the models included a random intercept of subject to minimize any participant differences and were fitted using four chains, each with 2,000 iterations (1,000 warm up) under the family setting "categorical". The Bayesian criterion for convergence used *Rhat* information, the potential scale reduction factor on split chains. A value greater than 1 indicates that the model has not sufficiently converged. Models 5 and 6 were excluded from the comparison because of their poor convergence. For Model 4 (with 6 main effects and their 2, 3 and 4-way interactions), the *Rhat* equalled 1, indicating

good convergence. The estimated effective number of parameters (*p_loo*) was used for model selection and identified Model 4 as the best fitting model, having the best model specification (Vehtari, Gelman & Gabry, 2017).

2.4.2 Model Structure

In this form of multinomial regression, there are two sets of baselines: 1) the response baseline used in the modelling, also known as the referential information to posterior distribution, was the '*fair*' response from the allocation measurement. The '*fair*' response was predominant (64.46%) compared to an '*advantage-self*' response of 26.04% and a '*disadvantage-self*' response of 9.50%. Taking the majority response as the baseline can favour the stability and accuracy of models (Browne et al., 2002). 2) the independent variable baselines which identified the defined level of each predictor that was used in all possible comparisons of main effects and interactions. The independent variable baselines in each trial are (as the underlined levels indicated in Table 2): Cost (vs NOcost), Competition (vs NOcompetition), Friend (vs Unknown-Peer), China (vs UK), Older (vs Younger) and Female (vs Male). Thus, in each analysis a fair allocation was compared with the other two types of response (advantages self, or disadvantages self) on the selected level of each predictor against all other possible comparisons of main effects and interactions. Positive regression weightings identify a greater likelihood of either advantaging oneself or the other protagonist in the conditions identified in brackets above.

The main effect of cost and all significant interactions from Model 4 are listed in Table 3. Each line identifies the comparison which shows the greatest difference from the baseline. For example, in the cost*competition interaction, the baseline of a trial where there is a cost to the child allocating equally and one where the children are competing for praise from the teacher, was compared with every other level (NOcost *Competition, Cost* NOcompetition & NOcost* NOcompetition). It might be assumed that the opposite to the

baseline (in this case NOcost*NOcompetition) is the most important comparison, but this is not necessarily the case. We discern the effects by examining all the mean probabilities for each of the levels in Figures 3-7, while the regression values in Table 3 refer to the greatest difference. Each interaction is summarised in figures that estimate the probabilities of making an allocation relative to the initial analysis displayed on the left-hand side of the figure.

To make this output easier to interpret, specific types of interaction in Model 4 are classified in different groups. We followed two classification rules. First, each section of Table 3 moves from lower order effects to higher order interactions. For example, it starts with the single main effect (line 1) and the two-way interactions (starting with 2.1), then to the three-way interactions (from 3.1) and four-way interactions (4.1). Secondly, interactions examining similar effects were grouped together and related to higher order interactions which qualified lower order ones. For example, we place 3.5 and 4.4 together because they both identify the joint effects of cost, competition and relation. Therefore, Table 3 contains six sections: 1) the main effect of cost and its 2-way interactions with five other factors; 2) the cost*competition effect and its higher order interactions; 3) the cost*relation effect and more complex interactions; 4) the cost*competition*relation effect qualified by gender; 5) the complex effects of cost in relation to the three structural factors (age, country & gender); 6) interactions excluded from this discussion as they did not involve cost.

Table 3

Summary of Significant Interactions in Model 4

	Line	Effect	B	E.E	l-95% CI	u-95% CI	Rhat	Bulk _ESS	Tail_ ESS
1	1	Ad:cost	-7.26	1.97	-11.61	-3.94	1	712	1360
	2.1	Ad:cost*competition	5.68	1.96	2.27	9.84	1	857	1627
	2.2	Ad:cost*relation	-5.81	2.44	-10.86	-1.32	1	1722	1508
		Dis:cost*relation	-5.36	2.95	-12.18	-0.37	1	1761	1671
	2.3	Ad:cost*age	6.06	1.98	2.49	10.37	1	743	1200
	2.4	Ad:cost*country	4.83	1.99	1.35	9.12	1	739	1436
	2.5	Ad:cost*gender	5.48	1.98	1.93	9.75	1	725	1338
2	3.1	Ad:cost*competition*country	-6.39	1.99	-10.53	-2.75	1	965	1911
	3.2	Ad:cost*competition*gender	-5.31	1.97	-9.38	-1.66	1	941	1789
	4.1	Ad:cost*competition*country*gender	7.18	1.86	3.68	11.08	1	1297	1635
		Dis:cost*competition*country*gender	5.48	3.16	0	12.53	1	1295	1654
	4.2	Dis:cost*competition*age*country	-6.28	2.86	-12.41	-1.03	1	2103	2138
3	3.3	Ad:cost*relation*country	6.22	2.26	2.06	10.95	1	2036	1763
	3.4	Ad:cost*relation*gender	5.35	2.32	1.18	10.18	1	1765	1673
		Dis:cost*relation*gender	7.73	2.95	2.29	14.13	1	1948	2273
	4.3	Ad:cost*relation*age*country	-2.91	1.5	-5.9	-0.1	1	3786	3036
4	3.5	Dis:cost*competition*relation	6.63	2.95	1.56	13	1	1810	1657
	4.4	Dis:cost*competition*relation*gender	-6.02	2.58	-11.31	-1.09	1	2080	2278
5	3.6	Ad:cost*age*country	-5.82	2.01	-10.12	-2.19	1	882	1242
		Dis:cost*age*country	7.99	3.31	2.13	15.23	1	1513	1865
	3.7	Ad:cost*age*gender	-5.86	1.96	-10.02	-2.29	1	828	1417
	3.8	Ad:cost*country*gender	-8	2.03	-12.18	-4.25	1	964	1389
	4.5	Ad:cost*age*country*gender	6.69	1.93	3.2	10.71	1	1249	1538
		Dis:cost*age*country*gender	-6.83	3.01	-13.41	-1.49	1	1654	2184
6		*Ad:relation*country*gender*	*-2.8*	*1.24*	*-5.24*	*-0.35*	*1*	*2119*	*2651*
		*Dis:competition*age*country*	*5.66*	*3.1*	*0.33*	*12.53*	*1*	*1511*	*2002*
		*Ad:competition*age*country*gender*	*-2.75*	*1.42*	*-5.6*	*-0.03*	*1*	*1753*	*2697*
		*Dis:age*country*	*-6.51*	*3.32*	*-13.74*	*-0.73*	*1*	*1415*	*1812*

Note. B= Estimated Regression Coefficient; E.E. = Est.Error. CI represents posterior credible intervals. These are the Bayesian equivalent of confidence intervals which are dependent on the prior distribution. When the 95% CI excludes 0, this means there is a 95% chance of obtaining the experimental effect. For each parameter, Bulk_ESS and Tail_ESS are approximate measures of effective sample size for bulk and tail quantities respectively (good values are identified if ESS > 400), and Rhat is the potential scale reduction factor on rank normalized split chains (at convergence, Rhat = 1).

2.4.3 Model Interpretation

As line 1 in Table 3 shows, the only main effect found in the model was cost. Plot 1 in

Figure 3 depicts the three choices in each condition, the probability of being fair and its

associated credible interval (respectively the red dot and the red line). This was roughly

equivalent to advantaging oneself (the green dot on a green line) when being fair was costly

(giving both participants two crayons, rather than allocating one child three). In contrast, when there was no cost to the child (distributors always have the choice to allocate themselves three crayons whether being fair or not), this ratio changed significantly. This was at the expense of selfish allocations which were reduced in cost-free trials (Line 1 in Table 3, identified as 'Ad:cost'). The regression is significant and negative because in the cost-free trials the children advantaged themselves significantly less. Note that the choice to disadvantage oneself (the blue dot on a blue line) was very low in both types of trial.

Plots 2.1 and 2.2 in Figure 3 show how cost interacted with the other dynamic manipulations: competition and relation. In both there was a lower probability of participants making a fair allocation (red) and greater chance of them advantaging themselves (green) in costly trials. When competition was involved, the probability of advantaging oneself was greater when there was a cost than in all other conditions (see the relative heights of the mean probabilities [green and red] across Figure 3, Plot 2.1). Children were less likely to advantage themselves if they were with an unknown peer rather than a friend, even when there was a cost to be fair. When it came to cost-free trials, children were less likely to disadvantage themselves with a friend (see line 2.2 and 4 of Table 3 and Plot 2.2 in Figure 3). This suggests that these children generally allocated fairly with unknown peers regardless of the cost.

Figure 3

The Main Effect of Cost (1) and the Two-Way Interactions of Cost with Competition (2.1),
Relation (2.2), Age (2.3), Country (2.4) and Gender (2.5)
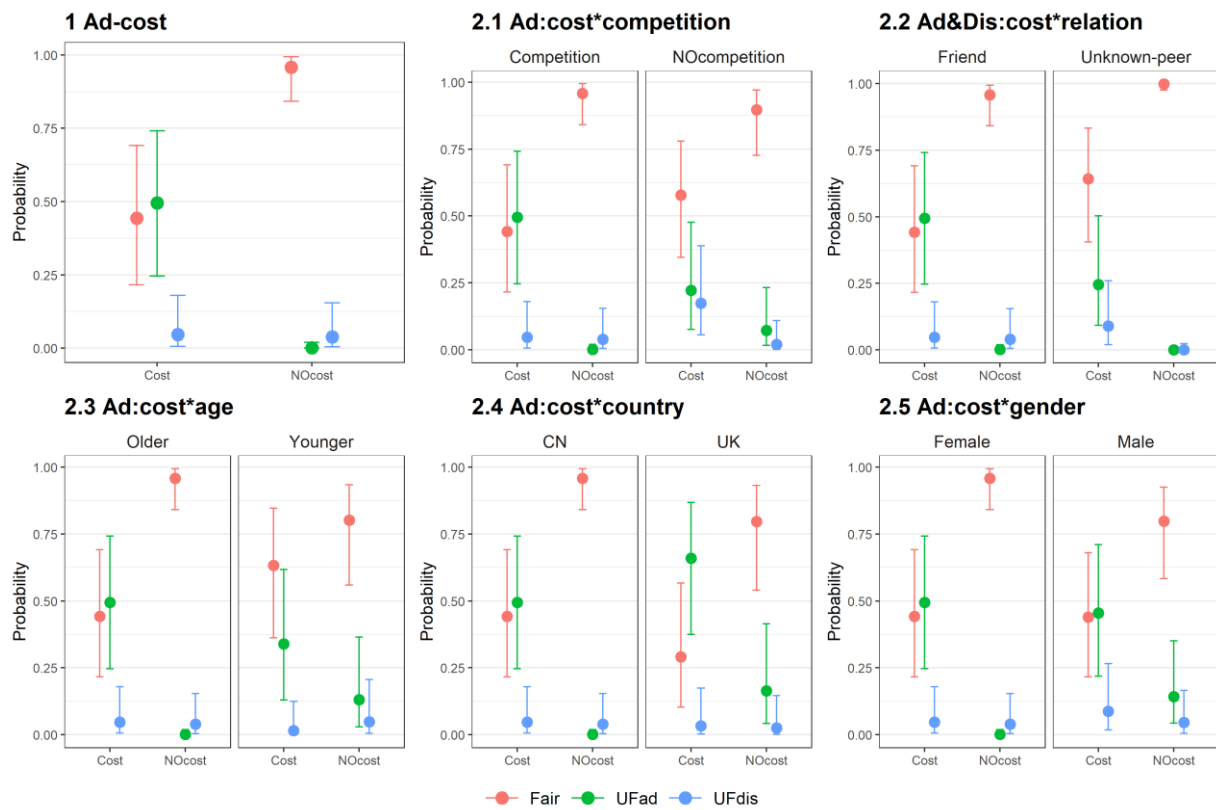
Note. The red colour dot on a red colour line (Fair) represents the estimated mean for probability of fair allocation (with associated credible intervals), green colour (UFad) shows the proportions of allocations which advantage the self, blue colour (UFdis) represents unfair allocation but disadvantage-self behaviour.

The second row of Figure 3 displays how cost interacted with the three structural factors: age (Line 2.3 in Table 3 and Plot 2.3 in Figure 3), country (Line 2.4 in Table 3 and Plot 2.4) and gender (Line 2.5 in Table 3 and Plot 2.5). The contrast between the costly and cost-free conditions was significant in all three analyses. In older participants, Chinese children and females the difference between the two conditions was significant because the differences between the selfish allocations (probabilities and credible intervals indicated by the green colour) in each condition (costly vs NOcost) were greater than in the other age

group, country and gender. However, for the contrast group (younger, British and males),

their selfish behaviours were more in evidence, even in cost free trials.

Figure 4

The Estimated Probabilities for the Cost*Competition Interaction with Country, Age and Gender
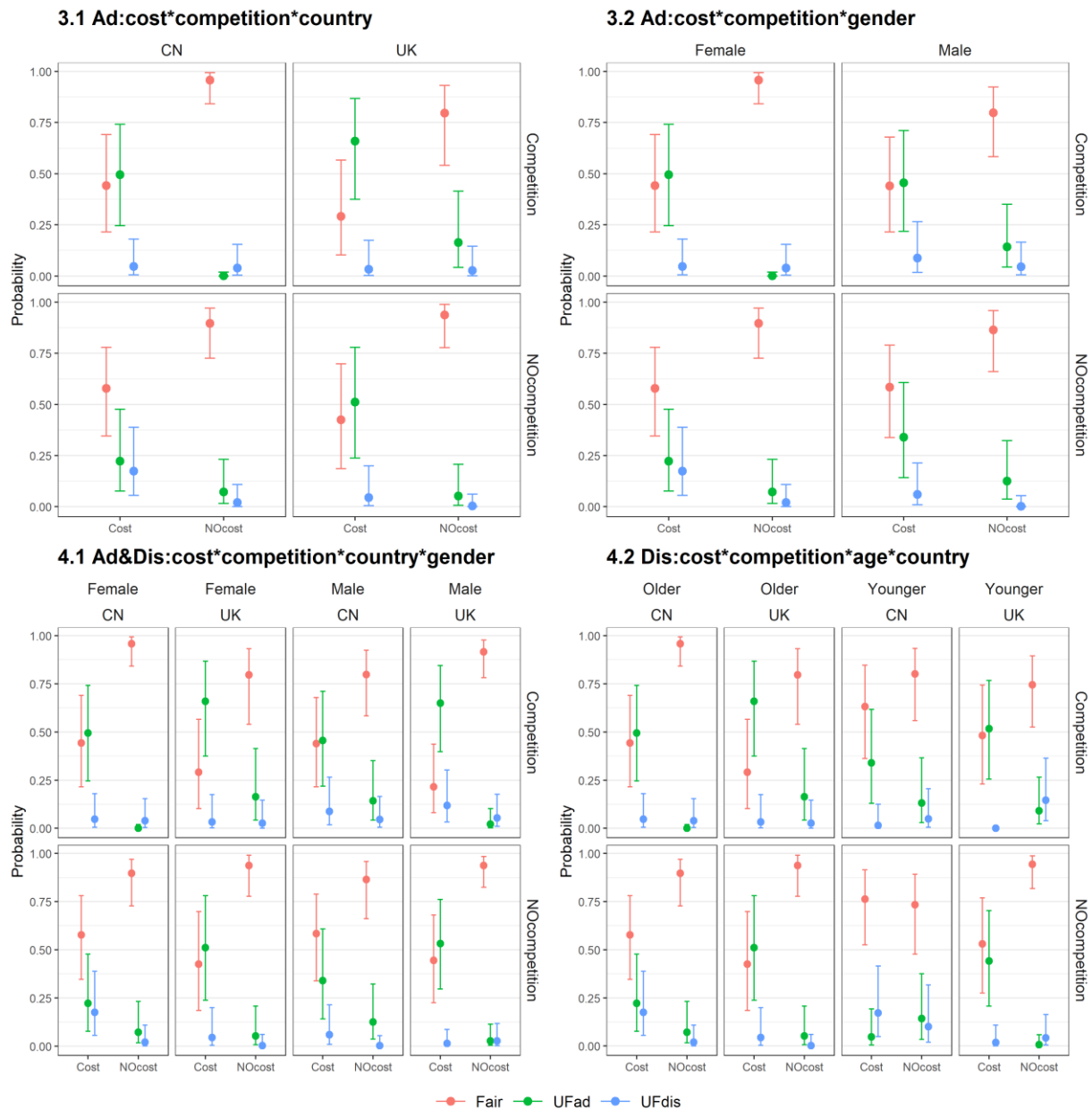
Plot 3.1 in Figure 4 shows the cost*competition*country interaction (Line 3.1 in

Table 3). The significant difference between the probability (indicated by the red and green)

distributions on the right side of the top left panel suggested that Chinese children were less

likely to advantage themselves in NOcost and competition trials. In the

cost*competition*gender interaction (Line 3.2 in Table 3 and Plot 3.2 in Figure 4), females

were less likely to advantage themselves in the NOcost and competition conditions. In

addition, country and gender interacted to qualify cost*competition interactions (Line 4.1 in

Table 3 and Plot 4.1 in Figure 4). British males were more likely to advantage themselves in

the cost and competition trials. This result complements what was found earlier (from the

lower order interactions: 3.1 and 3.2) in that the Chinese females were less likely to behave

selfishly. Indeed, they even were more likely to disadvantage themselves as shown by the

overlapping green and blue credible intervals on the left of the bottom left panel (Plot 4.1 in

Figure 4). Finally, age also played a part in cost*competition interactions with country.

Within costly trials involving competition, younger British children were less likely to

disadvantage themselves, represented by the blue dots and lines in Plot 4.2 in Figure 4 (Line

4.2 in Table 3).

Figure 5

The Cost*Relation Interaction with Country (3.3), Gender (3.4) and Age*Country (4.3)
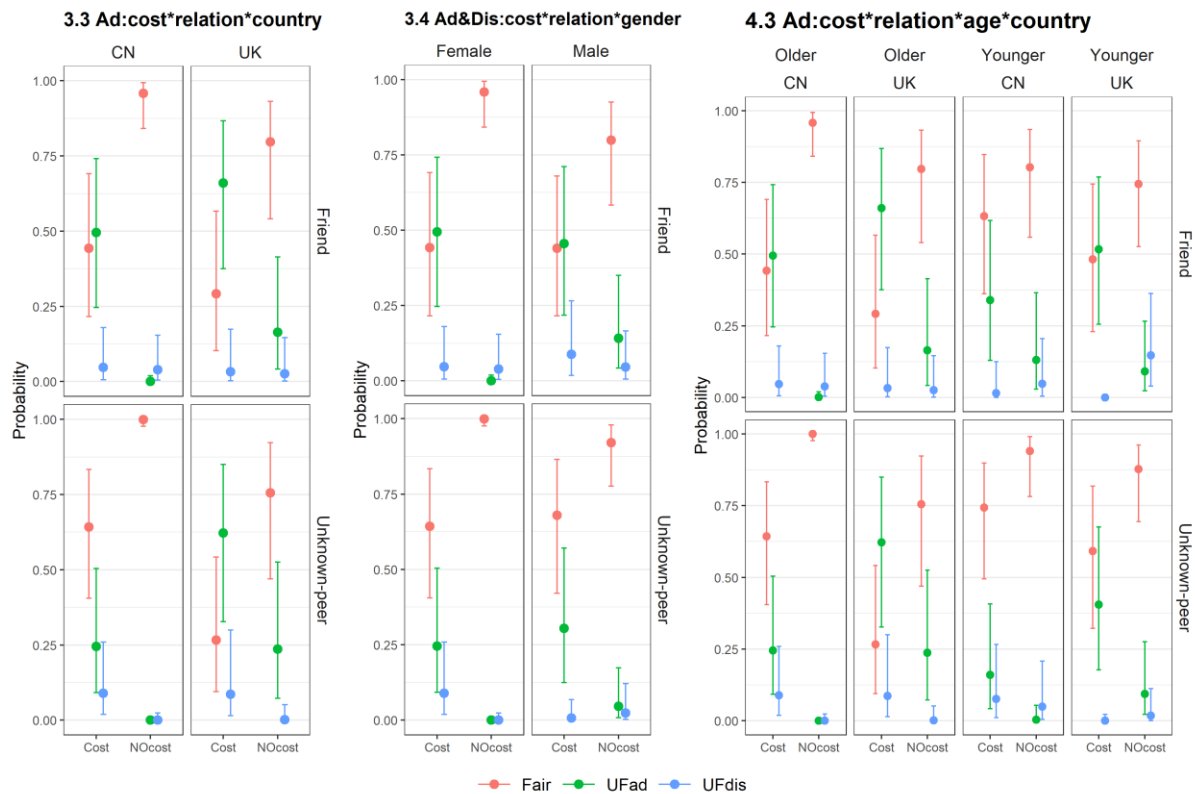
The dynamic factor relation (allocating to a friend vs an unknown peer) also interacted with cost within three high level interactions. When a trial was costly, both British children (Line 3.3 in Table 3 and Plot 3.3 in Figure 5) and females (Line 3.4 in Table 3 and Plot 3.4 in Figure 5) behaved more selfishly towards a friend. In addition, females were more likely to disadvantage themselves for an unknown peer. The cost*relation*country interaction, discussed earlier, was also modified by age. In contrast to British children's more selfish allocations, Chinese children, especially older ones when paired with an unknown peer, were less likely to be selfish when a trial was non-costly – i.e. where the child could make a 3:3 or a 3:1 allocation (Line 4.3 in Table 3 and Plot 4.3 in Figure 5).

Figure 6

The Cost*Competition*Relation (3.5) Interaction (And) with Gender (4.4)
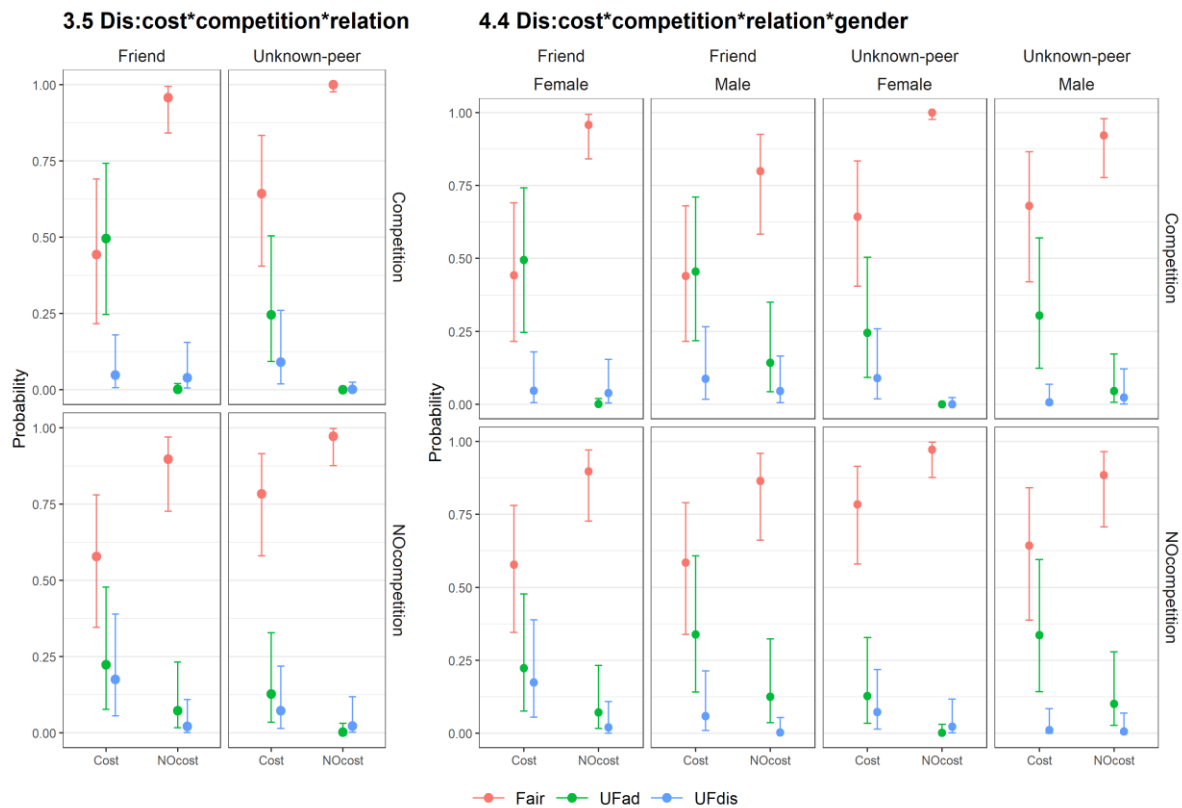
Not only did competition and relation interact with cost separately, all three manipulations interacted with each other (Table 3, Line 3.5) and this three-way interaction was also modified by gender (Line 4.4). As shown in Plot 3.5 in Figure 6, within a trial that did not involve a competition but did include a cost, children were more likely to be generous towards a friend. Nevertheless, when gender entered the model (Plot 4.4 in Figure 6), we found that females were more likely to be selfish with an unknown peer in the very same trial. This suggests that the children's generosity is likely to be directed to friends, in contrast with their selfishness with non-friends, especially for females.

Figure 7

The Effects of Cost*Age*Country(3.6), Cost*Age*Gender(3.7), Cost*Country*Gender (3.8) and Cost*Age*Country*Gender (4.5)
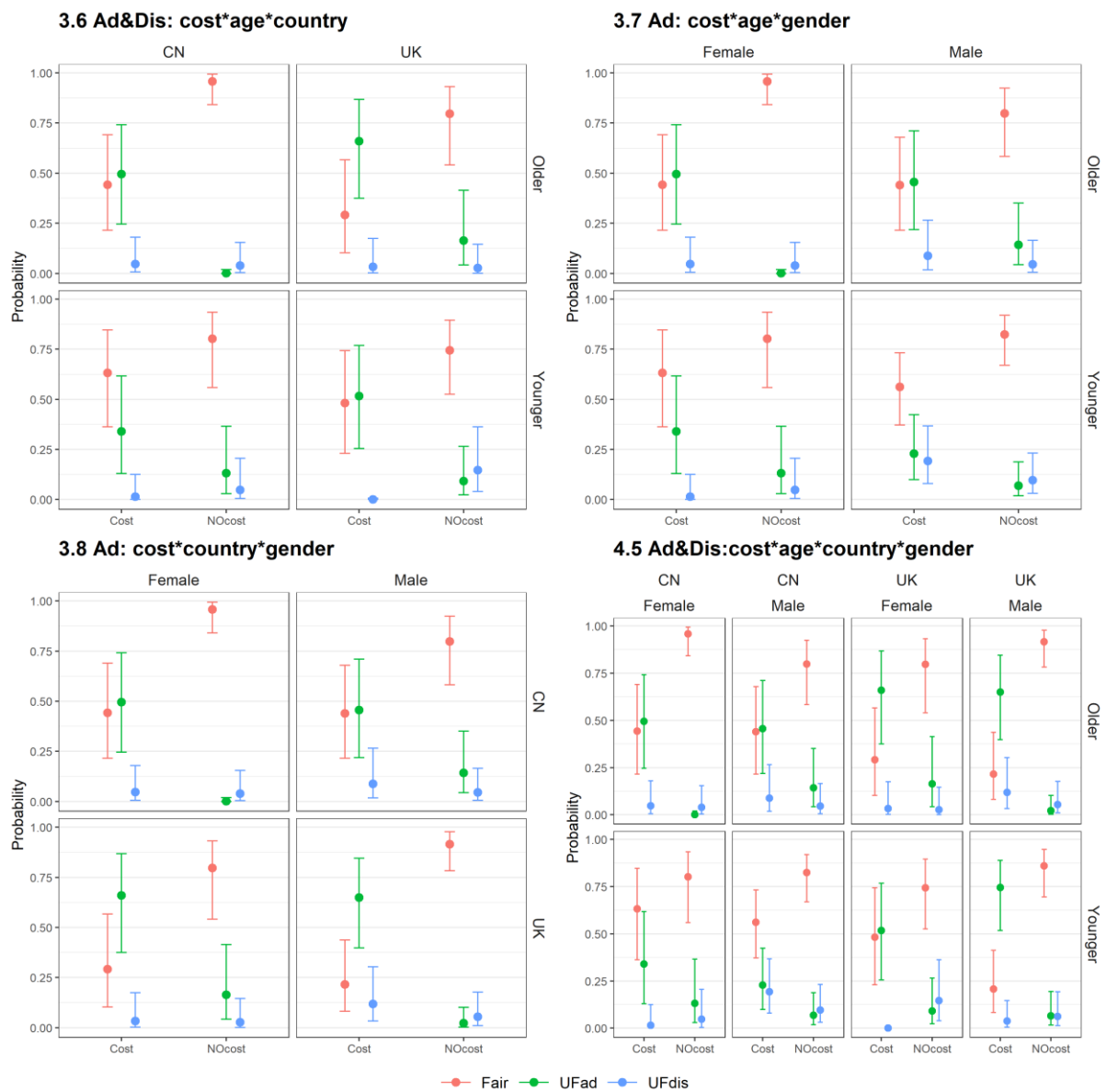
Cost also interacted with all three population variables: age, country and gender. As shown by the significant difference between probabilities for making a fair allocation and advantaging themselves (the red and green colours on the right side of the top left panel of Plot 3.6, 3.7 and 3.8 in Figure 7), when there was no cost to be fair, older Chinese children (Line 3.6 in Table 3), older females (Line 3.7 in Table 3) and Chinese females (Line 3.8 in

Table 3) were less likely to advantage themselves. The contrasting group, younger British males, were most likely to advantage themselves in costly trials (Line 4.5 in Table 3 and Plot 4.5 in Figure 7).

Finally, it is important to note the disadvantage-self behaviours represented by the blue dots and lines, in which children chose to allocate more items to the other participant. Ten out of 23 significant effects concerned this type of allocation, representing 9.5% of allocations. For example, in interactions 3.6 and 4.5 within Table 3 and Plot 3.6 of Figure 7, younger British children were more likely to disadvantage themselves when the trial did not involve a cost to themselves. Interaction 4.5 suggests further that the older British children, especially the boys, did the opposite: they were less likely to be generous in non-costly trials shown in Plot 4.5 of Figure 7.

2.5 Discussion

Our focus on the influence of six factors (age, country, gender, cost, competition and relation) on preschoolers' fairness allocations allows us to analyse the two different models (Figure 1) derived from the literature to develop our understanding of these influences. The results clearly suggest that the Independence Model can be ruled out as it does not explain the many interactions that have been identified in this and other studies, concerning cultural variation (Blake et al., 2015), gender differences (Houser & Schunk, 2009) and the other interactive influences depicted in Figure 1. Our analyses explored the relationships between these. Even the Interactive Model is not sufficient to capture the complexity of interactions shown in Table 3 and we need to develop the Interactive Model into a more uniform framework. With some important caveats, described below, we propose that fairness allocation fits better into a Dynamic Cost Model, depicted in Figure 8. In this section we first describe how this new model was constructed before analysing its three key findings in

relation to previous studies. Then we discuss its limitations before considering its

implications for future research.

Figure 8

The Dynamic Cost Model
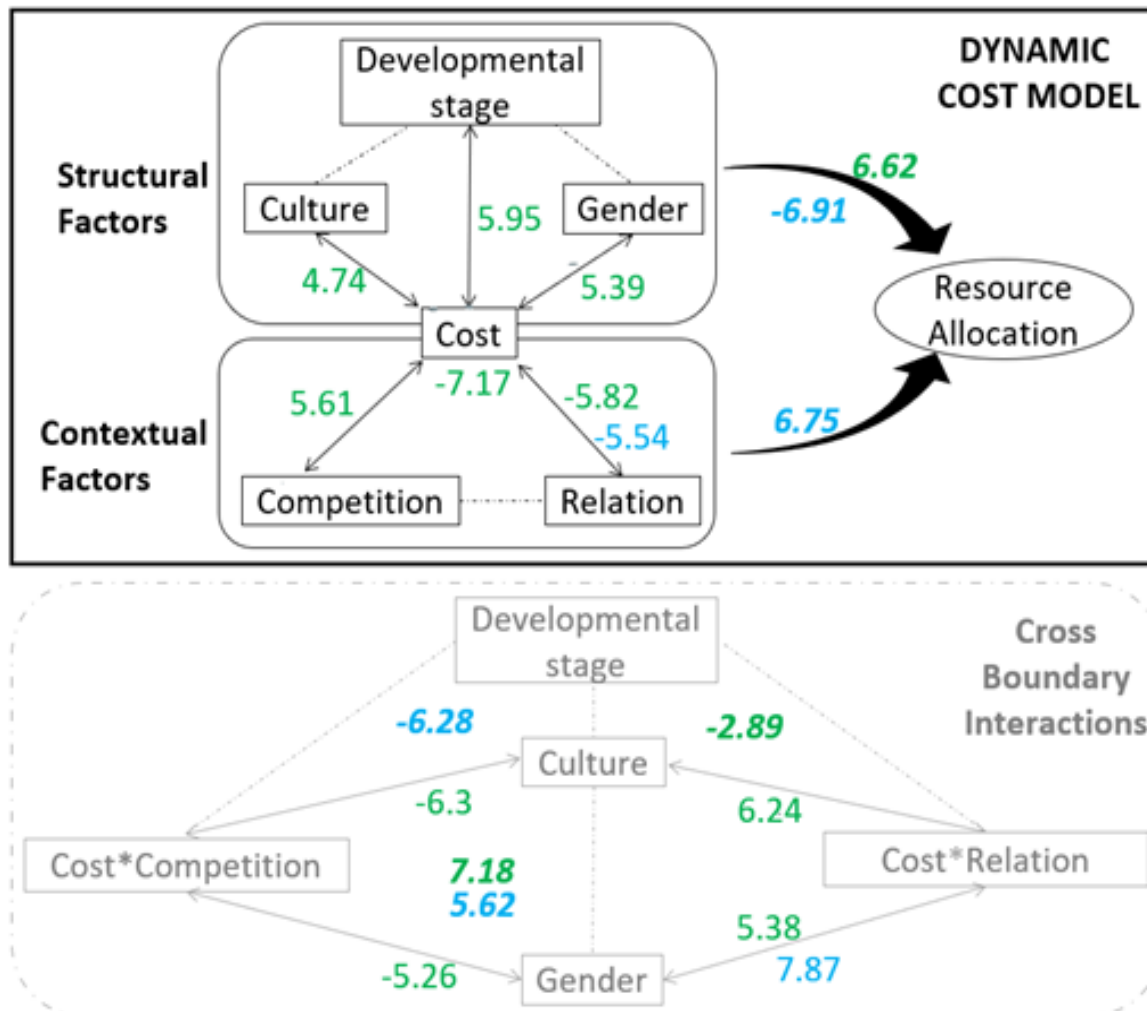
Note: How structural and contextual factors combine to influence resource allocation. The numbers in green report the beta value for allocations in which the children advantage themselves, while those in blue identify where children disadvantage themselves. The upper segment describes the main effect and interactions involving cost and within the two manipulations (Structural vs Contextual Factors), while the lower (grey) segment shows other effects and interactions involving cost which include both types of manipulation.

2.5.1 The Dynamic Cost Model

The model in Figure 8 identifies that fairness allocations are affected collectively by one single main effect, the cost of acting fairly, and its associated interactions. This is at the hub of more complex two-way, and higher order interactions among the three structural factors (age, country and gender) and two other contextual factors (competition and relation) that were examined. The numbers in green report the beta value for allocations in which the children advantage themselves, while those in blue identify where children disadvantage themselves. The five solid lines with arrows identify the significant two-way interactions with cost and the other factors (culture, developmental stage, gender, competition and relation). The three nonsignificant two-way interactions depicted by dashed lines are included as they are part of significant higher-level interactions, summarised in the curved arrows, in bold italic font, on the top right of Figure 8. All three structural factors in the top box interact with cost to influence allocations that both advantage and disadvantage the child, while the three-way interaction of contextual factors only affects the likelihood of disadvantaging oneself. The lower section of Figure 8 shows the interactions which cross the boundary between structural and dynamic factors. We note that these also involve cost, but they will be discussed only in brief.

As represented by the curved arrows in Figure 8, there were higher level interactions between two general types: the four-way interaction among the structural factors: cost*age*country*gender and the three-way interaction among the contextual factors, cost*competition*relation. The strong beta values associated with these suggest that they bind the lower order interactions displayed in each box. Our discussion of these two key interactions helps us to understand the lower order ones.

The cost*age*culture*gender interaction confirms and extends previous findings. When a trial made an allocation potentially costly to the child, the effects of developmental

stage, culture and gender conformed with previous studies, showing greater fairness in females, Chinese participants and older children. Interestingly these manifested themselves in higher order interactions but not in main effects. Gender differences have been less investigated in children, but a longstanding strand of research suggests that female adults are more sensitive to contextual information and, overall, often show greater proportions of equal allocations (Andreoni & Vesterlund, 2001; Brañas-Garza et al., 2018; Eckel & Grossman, 1998). However, it should be noted that the girls in this study seemed to show greater fairness if trials incurred were cost-free. Losing rewards made girls conform to the actions of the boys.

2.5.2 The Structural Effects

That, across different scenarios, the Chinese children appeared to be more sensitive to fairness principles is consistent with findings that people from collectivist cultures weight fairness more heavily than those from individualist societies (Rochat et al., 2009). In China, following Confucian tradition, very young children are under pressure to maintain harmony, to behave fairly and to act generously (Li et al., 2016). As a result of this cultural influence, these Chinese children were more fair across trials. However, these effects were qualified by the type of trial. The culture effect was in evidence where a fair allocation incurred a cost, as under such circumstances it was younger British males who were particularly likely to allocate more to themselves. So cultural differences, like those concerning gender, manifest themselves only when cost is involved.

While our data generally followed the expected developmental trajectory in which children's fairness preferences grow stronger with age, the literature suggests that participants under age 8 find it difficult to enact fairness (Blake & McAuliffe, 2011; Kogut, 2012). We found that even between the ages of 3 and 6, there were subtle developmental shifts and a general pattern of responding which is slightly at odds with some previous

findings. First, younger British children found it more challenging to allocate fairly in trials which incurred a loss to themselves, replicating previous findings (Fehr et al., 2008). Yet, overall, these children appeared to be more attuned to the fairness principle. In Fehr et al.'s study, 3-5-year olds adhered to egalitarian principles in half the trials, while 77% of our 3- to 5-year-olds made fair allocations. This proportion was found only in Fehr et al.'s older group (7-8 years old). This was not simply a product of half this sample being Chinese, as the British children were only marginally less fair across trials than their Chinese peers even though the task was equivalent to that conducted by Fehr's team.

That children vary in their allocations across different types of trial implies that we need to refine the idea that pre-schoolers show a concern to simply follow the principle of normativity (Rakoczy & Schmidt, 2013), including equal allocation. The literature suggests that this principle becomes replaced by a commitment of appearing to be fair, without necessarily adhering to a strict moral code. This 'veil' of fairness is thought to emerge in middle childhood (Shaw et al., 2013) and persist in adulthood (Andreoni & Bernheim, 2009). However, the very variation between different trials may show that the relationship between being fair and appearing to be so is not just a developmental transition. The complex patterns shown in these data suggest that even four-year-olds seem able actively to weigh up a number of contrasting factors in making a decision between fairness judgements, selfish allocations and even altruistic gestures. These are modified by subtle influences marked by socialization processes like cultural and gender.

2.5.3 Contextual Interaction: Cost*Competition*Relation

The second main interaction that we reflect upon shows that cost also moderated the more dynamic influences of the contextual factors, relation and competition. Neither of these were significant as main effects but the three-way interaction (cost*competition* relation) and two-way interactions with cost (see Figure 8) reveal that fewer fair allocations were made

when the trials involved competition and when children were paired with a friend. The former finding is consistent with the literature (Pappert et al., 2017), but the latter contrasts with a longstanding tradition in which children reward friends more than acquaintances (Birch & Billman, 1986; Fehr et al., 2008; Liang et al., 2020). There are two possible reasons for this contrast. First, the Chinese children were more generous to unknown peers, but this does not explain why culture was only significant in interactions or why Liang et al found a preference for friends. Secondly, the manipulation of both relation and cost showed that children, even the Chinese preschoolers, became unwilling to share equally with a best friend if they lose out on greater spoils. This highlights the importance of cost as central to our analyses and proposed model.

The interaction between the contextual factors allows us to reflect further upon theoretical analyses which posit that children understand the rules of fairness, yet decide not to follow these rules. This is often discussed in terms of a knowledge–behaviour gap, according to which under the age 8 children find it difficult to regulate their behaviours to give up rewards (Blake et al., 2015; Blake et al.,2014). Adults are susceptible to the effects of social comparison (Festinger, 1954) and so too are 4- to 6-year-olds (Shaw & Olson, 2012). Like adults (Benenson et al., 2007; Blake & Rand, 2010; Sheskin et al., 2014), children monitor their partner's rewards in order to preserve their relative advantage. That we strive to eliminate discrepancies between our and others' achievements (Festinger, 1954) centres around social comparisons. These are found even in 4- to 6-year-olds (Shaw & Olson, 2012), including the choice between parity or not losing out of a reward.

Social comparison is likely to explain the universal and consistent effect of cost in our model and why even more meticulous preschoolers (older, Chinese children and females) were less fair when it became costly to allocate equal numbers of items. Our findings are consistent with those that identify that by the age of 8, or even younger, a major motivation is

to advantage oneself when equal allocation is disadvantageous (Benenson et al., 2007; Blake & McAuliffe, 2011; Blake & Rand, 2010; Blake et al., 2014; Sheskin et al., 2014).

2.5.4 General Conclusion

The preschoolers' sensitivity to social cues displayed here may well show that the proposal of a knowledge–behaviour gap is too simple. Even the three-year-olds showed a sensitivity to a mix of constraints when resolving the balance between self-interest and social norms. To do so they needed actively to extract information from social contexts and strategically balance the fairness principle against their relative advantage when making an allocation. Weighing these factors against each other may explain the protracted development of how children divest resources. This is entwined with their unfolding social understanding (e.g., Flook et al., 2019; Stack, & Romero-Rivas, 2020) and cognitive control (Chernyak et al., 2019; Liang et al., 2020).

Generosity It is important to dwell briefly upon one striking finding concerning the balance between the norm of fairness and self-interest. In nearly 10% of trials, and one-third of uneven distributions, children acted generously when they had the option of allocating equal rewards or even advantaging themselves. We were able to discern this given that we allowed the child to make all three types of distribution (c.f. Blake et al., 2014; Moore, 2009; Pappert et al., 2017). Previous studies have suggested that children become prosocial or simply reject advantageous inequality at a much older age, usually around 8 years old (Fehr et al, 2008). It could be that these younger children were so inexperienced that they act altruistically but are unaware of their generosity or the loss to themselves. However, our data may reveal a need for theory to move beyond the norms of reciprocity to incorporate children's grasp of altruism which is evident even in late infancy (Schmidt & Sommerville, 2011). Even preschoolers do not simply deliberate between selfish and 'fair' allocations –

they have the propensity to be generous, especially towards a friend within a competitive trial as long as a cost is not involved.

As reported above, the model presented in Figure 8 is actually an over-simplification. There were other interactions, displayed in Table 3, which straddled the structural-contextual border drawn in that model. Nevertheless, each of these incorporate an effect in which cost is a central influence and their addition serves only to make the main finding of the paper more pronounced – a trial with a cost relieves the tension in the balance between altruism, fairness and selfishness. That we do not incorporate these other interactions into the top part of Figure 8 may be regarded as a limitation of the study, as is the fact that this model was produced as a result of our analyses and needs further empirical testing. The proliferation of higher order interactions found in our statistical analysis and the centrality of cost to these suggest that manipulations of individual effects which have predominated in studies of fairness may identify their individual contributions. Yet, they conceal the possibility that children's allocations in tasks derived from the Dictator Game task are determined by a complexity of factors, especially interactions among social contexts like whether participant is in competition with the recipient and if that child is a peer or a friend. The interactions between these reveal the complexity of influences experienced even by preschoolers and suggest that development concerns a more subtle and gradual grasp of how gaining rewards may be reconciled with the principle of fairness. Indeed, the findings of this study suggest that researchers neglect such interactions at their peril.

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Chapter 3: Justification for Fairness Allocation

Can young children justify how they allocate resources? Contextual variations and cultural differences reveal developmental changes.

Research Highlights

- Researchers are divided over the extent to which young children understand the principle of fairness.

- We examined this by systematically manipulating contextual influences on 3-6-year-old children's justifications of their allocations of equal or unequal resources to themselves and another child.

- Children's justifications systematically reflected the contextual cues presented across trials, including differences between China and British children's reference to principles.

- The manipulation of social contextual cues, relevant to children's experience, helps us to understand the development of fairness and related principles.

Keywords

Justification for Resource Allocation; Fairness Understanding; Fairness Principles; Cultural difference; Development Difference; Social Pressure

3.1 Abstract

With growing evidence of young children's advanced performance in resource allocation tasks, we need to understand the complexity of principles like fairness behind these allocations. Yet, studies have found it hard to obtain coherent justifications from this age group. We interviewed 3-6 year olds to analyse how they justify their allocations over a series of trials in which fairly sharing resources was manipulated by contextual pressures. Two-hundred-four children from two age groups and two cultures were asked to justify their allocations which they made under three settings manipulating the cost of being fair and whether a trial involved both competition or a friend/stranger. Multinomial regression revealed that children's equal distributions were justified using the normative principle of fairness, that selfish allocations tended to be justified by references to desires and that sharing with friends often stimulated discussion about affiliation. More desire responses were reported by British children generally. These results show that even preschoolers' justifications differ systematically with changes to the context of the task. The presence of contextual cues in allocation task prompts children to apply fairness principles flexibly in response to different allocation dynamics.

3.2 Introduction

Over the past decade there has been renewed interest in the ontogeny of the concept of fairness. The traditional view of a gradual, stage-like progression held that children endorse equal allocation at the age 5 or 6, but do not grasp the principles of merit and need until 11 or 12 (Damon, 1977; Hook & Cook, 1979). Yet, increasing evidence suggests a much earlier appearance of fairness understanding, even within infancy (Sloane et al., 2012; Smith et al., 2013; Sommerville et al., 2013). Children show a visual preference for equal distributions around age 2-3 (Baumard, 2012; Ng et al., 2011; Sloane, 2015) but may not internalize the complexity of fairness principles until they are 7 or 8 (Blake & McAuliffe, 2011; Fehr et al., 2008; Shaw & Olson, 2012). However, we know little of the underlying factors involved in this developmental shift, let alone how younger children come to understand and articulate the fairness of allocations they have made. This under-investigated issue is the focus of this paper. We analyse how young children justify their allocations of equal and unequal quantities under a mix of social pressures, discussed below, in order to examine whether these justifications directly reflect particular social influences which impact on their decisions. The aim is to provide a deeper knowledge of how children begin to reason about principles which are at the core of moral reasoning.

3.2.1 Justification as A Tool to Understand Children's Moral Understanding

Until recently, interest in justification has been sporadic. Despite a longstanding agreement that we need to include children's justification to reveal the reasoning processes behind their allocations (Piaget, 1932), judgement has been of primary concern in fairness studies. Researchers have used economic activities, such as the Dictator and Ultimatum Games, to learn about children 's understanding of fairness (Forsythe et al., 1994; Güth et al., 1982). The rationales behind their responses are inferred from behavioural data, like whether they accept or reject an allocation or the numbers of items given to the other party. However,

this approach cannot fully identify participants' reasoning behind these allocations. Justification has long been thought to serve as a key tool in acquiring this missing information (Anderson & Butzin, 1978; Damon, 1977; Nucci & Turiel, 1978; Sousa et al., 2009).

There are two likely reasons why justification is less apparent in the literature than studies where children simply make or decide whether to accept allocations. The first comes from a longstanding concern about children's ability to understand how to answer questions within the context of interrogation from an experimenter. Increasing evidence has revealed that children's reasoning is often hidden in their responses. They may, for example, provide an answer to a nonsensical question ('Is red heavier than yellow') and provide an explanation (e.g., 'because red buses are bigger than yellow buses') (Hughes & Grieve, 1980; Waterman et al., 2000), simply because they do not realise that saying they do not know is acceptable (Scoboria & Fisico, 2013). Alternatively, they may simply not respond to a question because they do not understand the experimenter's language or why a justification is sought. It has been suggested that research in developmental psychology would benefit from lessons learned from research within forensic psychology in its close analysis of children's answers to specific supportive questions. Forensic researchers and practitioners have taken pains to identify the complexity of issues involved in asking children to make justifications, including clear preparation of the child before they are questioned and using open questions which do not lead or undermine the child's previous responses (Malloy & Stolzenberg, 2019). In doing so the accuracy of children's recall through appropriate questioning has been improved (e.g., Brown et al., 2019). Therefore, the children in this study were asked to justify the allocation made immediately after each trial with a simple non-ambiguous probe. This constrained the context of the question, with the aim of making it more easily understandable.

Secondly, studies of children's grasp of fairness may have overlooked the importance of justification because of the suggestion, from a social intuitionist perspective (Haidt, 2001), that moral judgments are shaped mostly by intuitions, often inaccessible to conscious thought, while reasoning primarily occurs post hoc, to justify, rather than inform, the earlier judgment. Indeed, Hauser et al. (2007) rationalist accounts found that adults often justify their moral judgements by appealing to arguments unrelated to the intuitive principles guiding their judgment. From this perspective, even adults lack access to the actual factors influencing their moral decisions (see also Cushman et al., 2006). Such a view has influenced thinking within developmental psychology, but current theoretical analyses tend to blend intuitionist and rationalist accounts of how such judgements are made (Rhodes & Wellman, 2017). Hence, it seems timely to reinvestigate the reasons behind children's distributions of resources. In this study, we aim to present children with dynamic social contexts that influence the nature of their allocation. We attempt to understand how they account for their judgement by eliciting their justifications after they have distributed resources.

3.2.2 The Development of Fairness Principles

Justification was a central feature in early studies of children's moral reasoning, including the identification of the principles that guide fairness allocations. The earliest Dictator Game research that probed children's reasoning directly is Sigelman and Waitzman's (1991) study that analysed their descriptions of whether their allocations were fair. They presented participants with three different scenarios, Reward-for-Work, Voting on a one-person-one-vote basis and Charity, and three different types of recipient; for example, an older child, a 'most productive' child and a poor child. Then they asked 5-, 9- and 13-year-olds to distribute resources between themselves and the three recipients and then to justify their decisions within each context. The two older groups were very attentive to the demands of each scenario and adjusted their allocations flexibly, based on particular cues. For

example, they allocated resources to allow a poor child to have what is required in order to participate in a summer camp. They were also able to balance relative principles in making their judgements. Sigelman and Waitzman's results suggested that each contextual cue related to how allocations were made and how children justified their allocations. At the same time, younger children were less sensitive to social cues and divided items equally across three scenarios. Their 5-year-olds appeared unable to read social cues, suggesting that they treated all the scenarios the same, irrespective of the contextual demands.

However, it is difficult to distinguish whether the young children in Sigelman and Waitzman's study understood but failed to apply the underlying principles driving how they make distributions, or were given tasks that were too complex for them to comprehend. Over half (54.26%) the kindergarteners failed to produce an explanation, compared with 19.8% of 9-year-olds and 14.17% of 13-year-olds. Such a low response rate by preschoolers means that we cannot draw firm conclusions about their understanding of the principles underlying their allocations. Baumard et al. (2012) questioned Sigelman and Waitzman's study claiming that their experimental manipulations may have been too demanding for young children to grasp. Asking a five-year-old to give 9 dollars to three different characters in three different scenarios involves remembering and distinguishing at least 9 manipulations (to three characters in three settings) in one task.

Baumard et al. simplified the design and only presented one scenario, involving Reward-for-Work. They found that 3-year-olds understood the concept and allocated resources based on merit, but only a minority could give a verbal justification for this allocation. The differences in the results of these two studies suggest that in examining the influence of social context on young children's understanding and their use of complex fairness principles, we need to consider the tasks they are given and the circumstances within which a justification is sought. Therefore, our primary goal is to examine whether

preschoolers will attend to contextual information and use these cues to account for their actions after sharing resources; specifically, whether more appropriate justifications can be recorded when social context is manipulated.

A few recent analyses have attempted to examine younger children's thinking in fairness tasks (e.g., LoBue et al. 2011; Smith et al., 2013). For example, LoBue et al. recorded children's looking time, emotional and verbal responses during allocation as an indicator of justification. Even 3-year-olds expressed negative emotions about unequal allocations. They also looked longer at the other child's pile of stickers, although they did not comment on fairness explicitly. These subtle responses may reveal early signs of complex fairness principles, once an attempt to grasp their justifications is taken into account. More advanced understanding is thought to develop slowly. An equality expectation in resource allocation, which may serve as a primary grasp of fairness, may even emerge in infancy and early childhood (Geraci & Surian, 2011; Schmidt & Sommerville, 2011; Sloane et al., 2012). More complex principles are thought to emerge slowly after 5 or 6 years of age. For example, it is not until the age of 8 that children seem able to display their mastery by justifying fairness in inequality (e.g., Damon, 1977; Peterson et al., 1975; Piaget, 1932; Sigelman & Waitzman, 1991). Younger children appear to have a difficulty in justifying unequal distributions using need (someone experiencing hardship should receive more resources), merit (a person who contributed more in a collaborative task should be rewarded more) or agreement (the winner of a competition should gain the prize) principles (Deutsch, 1975; Feinberg, 1970, 1974; Lerner, 1977).

However, this view of a slowly developing understanding of inequality principles is now being challenged by emerging evidence of an earlier age of acquisition in allocation tasks. For example, 3-year-olds divide resources equally in a team that has worked collaboratively, taking contribution into account when making a distribution (Hamann et al,

2014; Kanngiesser & Warneken, 2012; Hamann et al., 2011). It remains unclear whether they would also provide accounts based on rewarding merit, as no justifications were analysed in these studies. Even in Sigelman and Waitzman's study (1991) 61% of 5-year-olds gave more stickers to a poor child compared to a wealthy one, but they did not articulate why. Preschoolers can apply need principles to justify fairness in allocations (Kienbaum & Wilkening, 2009; Paulus, 2014; Paulus & Leitherer, 2017). Such systematic division of resources by young children appears to reflect an application of the complex principles of need, merit and agreement, which have until recently been claimed to be only applicable to children older than 7 or even 8 years. Studies that seem to demonstrate complex moral understanding at an early age would benefit from a closer examination of children's justifications in order to help us to infer the motivation behind such judgements. Given that recent research shows that in the period leading up to the transition to school participants show developments in their allocation of resources in these distribution tasks and their reputational concerns are increasingly in evidence (Engelmann et al., 2018; Fu et al., 2016; Yazdi et al., 2020), our first hypothesis is that there will be development from the age of five in the sophistication of how children explain fair and unfair allocations that they have made across a variety of contexts, which we now consider.

3.2.3 Cultural Differences

Although the development of fairness understanding is universal in certain respects, it is still heavily affected by cultural differences. Children from different societies understand fairness differently and this understanding also develops in varied ways (Blake et al., 2015; House et al., 2013; Huppert et al., 2019). Children in the West emphasize autonomy and independence and establish an equality norm (Smith et al., 2013). By internalizing these norms slowly through early childhood, children from individualist cultures face peer pressure to maintain their social reputations, so they trade resources to satisfy their desire for a

positive social image (Botto & Rochat, 2019; Gummerum et al., 2008). They are more exposed to commercial experience (Henrich et al., 2010) so they need to balance a desire for material reward against a norm of egalitarian principles.

On the other hand, children from collectivist societies tend to emphasize obedience and conformity (Greenfield & Cocking, 2014). They face high social expectation to follow rules and conform to social norms and obligations, particularly regarding the social order and one's role within it (Greenfield et al., 2003). Children from collectivist cultures tend to view resource allocation less through a lens of egalitarianism and need, and more with regards to social hierarchies, than their Western counterparts (Huppert et al., 2019). When accounting for moral decisions, weighing up the balance between personal and conventional norms and moral judgements, Chinese 4 and 6 year-olds provide clearly differentiated judgements determined by the context, and their justifications at times differ from Western children (Yau & Smetana, 2003). They tend to offer normative justifications ('you should/should not do that') when rejecting moral transgressions, and understand conventional violations in non-normative, evaluative terms (e.g., evaluating 'a child choosing to use a bucket (instead of an umbrella) in the rain' as 'fun' or 'silly'). By contrast, American children tend to justify conventional violations as the acceptable expression of personal desires ('He wants to' use a bucket).

Given that children from different backgrounds perceive social contexts differently and their perceptions of these cues influence their fairness understanding, we expect to find a cultural difference in preschoolers' fairness justifications. Furthermore, display rules between the UK and China differ, with it being more acceptable for individuals in the West to share their inner desires and emotions than individuals in China (Matsumoto et al., 2008). Therefore, our second hypothesis is that children in the UK will be more likely to justify their allocation decisions by appealing to their own individual desires, while Chinese preschoolers

will be more likely to invoke social norms, reflecting the pressure or need to conform to rules, obligations or standards of conduct.

3.2.4 Contextual Manipulations

The above discussion collectively highlights the complexity of principles that children may need to draw upon in making and evaluating resource allocations. To investigate whether young children can identify subtle contextual changes upon how they apply and justify fairness principles, the most central goal of this paper is to explore young children's justifications of how they allocate resources to themselves and another individual when different moral and conventional pressures are applied. If we find shifts in how they account for their actions in different trials, we can extrapolate the nature of their underlying reasoning. The three manipulations made by Sigelman and Waitzman (1991) were all extracted from scenarios that are complex and challenging for young children. They had to balance three principles against one another (collaboration, charitable need and agreement), for example, when dividing up profits between the three different children, described above. However, other aspects of contextual information may be more appropriate for children in late preschool and early elementary school. We identified three particular dynamic factors which are more age-appropriate, namely, whether sharing resources brings with it a possible cost to the child, whether she is competing for the resources and whether resources are distributed with a friend or a stranger (relationship). These factors have been found to influence children's allocation significantly in the first Study (see Chapter 2) but rarely examined in relation to fairness justifications. We explain each of these three contextual manipulations next.

When maintaining parity requires participants to sacrifice their own interests, young children tend to give up fairness to avoid being disadvantaged (Fehr et al, 2008; Shaw & Olson, 2012; Thompson et al., 1997; Williams & Moore, 2014). Similarly, when the cost of

helping is too high, children withdraw the need principle and express less willingness to assist a recipient (Sierksma et al., 2014). These shifts are interpreted as consequences of two dominant forces in young children's fairness allocation: the balance between self-interest and normative motivation (Blake, McAuliffe & Warneken, 2014). The desire to keep more rewards for oneself can be overwhelming, especially for 3- to 6-year-olds (Blake & McAuliffe, 2011). Apart from these behavioural data, there is no direct evidence to indicate how children account for this cost effect as a principle. In order to close this gap in our knowledge, we aim to collect and analyse children's justifications while they make allocations in a variety of trials which manipulate the amounts awarded and the cost to each participant.

Secondly, an in-group member preference and favouritism in allocations have also been reported widely when children allocate rewards. Young children generally treat a friend or someone like them more fairly and generously (Bian et al., 2018; Fehr et al, 2008; Moore, 2009; Yu et al., 2016). Again, to the best of our knowledge, no study has analysed preschoolers' fairness reasoning within this context. Finally, children follow the assumption that the winner of a competition for resources is entitled to more rewards (Sigelman & Waitzman, 1991), but do they use this event as a principle to justify their actions? Hence, if children allocate more resources to themselves during a competitive trial, we need to establish whether they justify this competitive gain as a fair action or is simply a demonstration of their acquisitive impulses. Analysing children's justifications is the only way to test this.

We take cost, competition and relationship as the exemplars of social cues, to explore young children's application of fairness principles. Not only have these been shown to exert significant influences on children's allocations, this analysis focuses upon their justifications based on these contextual influences. We attempted to set up scenarios which are more

representative of preschoolers' daily experiences, making them as simple as possible for younger children to understand. Hence, our third hypothesis is that preschoolers' justifications will reflect the contextual cues which influence their allocations. More specifically, we predict that cost and competition in a trial will provoke more desire-related justifications, relative to norm-based justifications, given that costly and competitive contexts may bring self-interested motivations to the fore. By contrast, we predict that affiliation will become a principal consideration when children treat friends more fairly than they do strangers.

3.2.5 The Present Study

We modified previous means of coding young children's justifications (LoBue et al., 2011, Smith et al. 2013), in order to analyse children's fairness justifications in relation to their allocation in repeated trials (see **** for full details and analysis of children's allocations). By asking children to justify their allocations after each trial we aimed to examine whether three contextual manipulations, of cost, competition and relationship, would systematically alter not only preschoolers' allocations, but also reflect their understanding of fairness. The aim of the analysis presented here was to explore whether contextual manipulations guide children to navigate their way through complex social interactions and decisions in a variant of a Dictator Game task. We recruited children from two different countries: one individualist (the UK) and one collectivist (China) in order to examine if justifications are partly culturally grounded, and so might vary as a result of unique societal pressures. Namely, the strong social norms/expectations placed on Chinese individuals to conform rather than compete, and to maintain social harmony, even beyond close affiliates. Furthermore, we compared two age groups straddling the transition to elementary school as across this age span children have been shown to develop the ability to change their allocation of resources in different circumstances. The key questions concern whether

children can give a valid justification for different types of allocation and we examined what this informs us about children's understanding of the principles of fairness. In this study children allocated sets of tokens between themselves and another child. All changed their distributions across trials, enabling us to investigate whether particular types of justification are related to particular types of allocation.

3.3 Method

3.3.1 Participants

Two-hundred-and-four typically developing children were recruited from local nurseries and primary schools in two small cities (Dengfeng, China and Lancaster, UK). Both samples were largely working class, representing the majority population of their local neighbourhood. Participants were assigned to two year groups based on their ages and their year group divided, at the time of testing, at five years and three months. One-hundred-and-eight children aged 3 years and 2 months to 5 years and 2 months old (M=53 months, SD=5.83) were considered as the younger age group: 30 British boys, 26 British girls, 35 Chinese boys and 19 Chinese girls. The rest (96 children) were within the age range from 5 years and 3 months to 6 years and 10 months old (M=72 months, SD= 4.35): 27 British boys, 17 British girls, 25 Chinese boys and 25 Chinese girls. The study was approved by the Faculty of Science and Technology's Ethics Committee at Lancaster University, UK and written parental permission obtained from the parents in the UK and, in keeping with local practices, the head teacher in China. Children provided verbal agreement before testing.

3.3.2 Design and Procedure

The procedure is summarised in Figure 1. There were eight different demographic groups (two age groups, two countries and boys and girls). Each child took part in a resource allocation game (as detailed in Chapter 2) involving eight trials in which they selected photographs of groups of crayons on an iPad. Participants needed three colours in order

faithfully to copy a prototype (e.g., an apple, coloured green, red and brown). In each trial they chose first which set of alternatives to allocate: either 1 vs all 3 crayons in one set or equal numbers in a second set. The latter consisted of either 2 pairs in cost trials (only two of the three colours were available in each set) or two groups of 3 crayons in cost-free trials (where both children would receive all the required colours). Having selected either two equal sets (either two or three identical crayons for each child) or two unequal sets (one crayon for one child and three for the other), they then divided these alternative choices between themselves and a partner. Each trial varied in three ways, across eight trials: 1) Cost [one gets three crayons vs both get 2] or NOcost [both get 3 or one child gets 3 and the other 1]; 2) Competition [the participant competed with another child to produce the best picture] vs NOcompetition [both children were asked to produce a good drawing]; 3) Friend [the other participant was a friend at the nursery nominated by the child] or an unknown-peer [an age- and gender-matched peer 'who you have never met before and is from another school']. After they made an allocation between themselves and the recipient, their choice was shown on an iPad and they were then asked to justify their response, prompted by the experimenter: for example: '*Why did you decide to keep these three crayons and give away one crayon to NAME [the stranger peer]?*'(an example of the 'UFad' allocation).

Figure 1

The Procedure Flow Chart

Participant	Participant from one of the eight demographic groups: •Age group: Older vs Younger •Country: CN vs UK •Gender: Female vs Male
Context	Presented with one of the eight contexts (All eight trials were tested randomly): •Cost: costly (3:1 vs 2:2) vs No-costly (3:1 vs 3:3), First selected each set then divided the crayons within the set to both parties. •Competition: Contest vs Decoration •Relation: Friend vs Unknown peer
Allocation	Allocated the given resources to make one of the three possible distributions: •UFad: allocated 3 crayons to oneself and 1 to the recipient; •Fair: both parties received 2 (Costly trials) /3 crayons (No-costly trials) •UFdis: allocated 1 crayon to oneself and 3 to the recipient
Justification	Justified their allocations and were then coded as one of the five categories: •Desire-based •Norm-based •Affiliation-based •Discipline •Uncodeble

3.3.3 Coding Scheme for Justifications

Children's verbal responses to each open-ended question were coded into five categories (see Table 1). We adapted this coding scheme from previous research in which three general categories have been used, namely Desires, Norms and Uncodable (Blake et al., 2013; LoBue et al., 2011; Schmidt et al., 2016). Due to the manipulation of relationship, we added a fourth category, 'affiliation', in which an explicit statement is made, like 'Cos he's my friend'. We did not add a category referring to competition as we expected that relevant justifications would be classed within the 'desire' category. A fifth category emerged early during the testing and was reported sufficiently frequently to merit inclusion. We termed this Discipline as it refers to the claim that the distributor or recipient is more deserving of an advantage or disadvantage on account of a previous action or behaviour outside the context of the experiment—in other words, the distribution of resources reflects a disciplinary intervention in relation to one of the actors.

In order to test the inter-rater reliability of this coding scheme, a second rater coded justifications from 25 children following training. Cohen's Kappa was run to determine if there was agreement between two coders' classifications. The analysis showed that there was strong agreement between the two coders' judgements with 64-81% responses for each category were reliable, $\kappa = 0.80$ (95% CI, .62 to .98), $p < .05$ (McHugh, 2012).

Table 1

Justification Coding Scheme

Code	Category	Definition	Examples
1	Desires	explicit reference to satisfying one's own desires or imposing own desires on the other;	e.g., It's my favourite colour and I want to keep them all; She/he (the recipient) wants to have them
2	Norms	children used the words 'right' when the allocation meets their expectations, or explicit references to a standard of being fair, equal, or other moral rules;	e.g., Because it's fair; That's how it (the allocation) should be;
3	Affiliation	explicit reference to the relationship between the two parties (the distributor and the recipient)	e.g., Because he/she is my friend; Because we play together;
4	Discipline	explicit reference to self-evaluation of the disciplinary behavioural conduct of the two parties (the distributor and the recipient)	e.g., The teacher said I was naughty so I should have less; He/she (the recipient) behaved well so he can have more
5	Uncodable	responses that did not fit into the other four categories;	e.g., I don't know; Participants refused to respond or gave irrelevant answers.

3.4 Results

3.4.1 Justification Distribution

Figure 2 presents the frequency of each type of justification made by the children across the 1632 trials (in each panel). The top two panels display the proportions of each of

the 5 justification types broken down by age-group and country. The lower panel displays

these in terms of the three types of allocations made – equal ('Fair'), advantages self ('UFad'

- i.e., gives three to self and one to the other) and disadvantages self ('UFdis' - i.e., gives

three to the other child, but only one to self). Each panel adds up to 100%. Overall, over half

the children's allocations (57.11%) were classified in terms of Norms. The second highest

frequency (28%) was for statements identifying Desires. Of the rest, 8.27% mentioned

Affiliation, 3.19% referred to Discipline and only 3.43% were Uncodable. Figure 2 shows

that the predominant justifications (73.38%) referred to Norms in fair allocations. When

children advantaged themselves (UFad allocations), they tended to mention Desires (60.92%)

but also invoked Norms in 25.87% of cases. Children's justifications became more diverse

when they gave the other child more than themselves (UFdis allocations). In these trials,

56.19% of responses were Affiliation related, 32.24% referred to Norms, 27.23% Discipline,

25.18% Desire and 16.58% were Uncodable. We also found opposite patterns on two specific

justifications by comparing each age group in the two countries. Younger Chinese children

made fewer references to norms than older Chinese participants ($N_{younger}$ =180 vs N_{older} =277).

However, British children did the opposite ($N_{younger}$ =251 vs N_{older} =224). Another difference

was found on the *Discipline* level. While none of the British children justified their

allocations using discipline, it was the dominant responses given by younger Chinese

children compared to older ones ($N_{younger}$ =50 vs N_{older} =2). The frequency plot of each

justification by age group in Chinese and British children can be found in Appendix 1.

Figure 2

Justification Distributions by Age Group, Country and Allocation
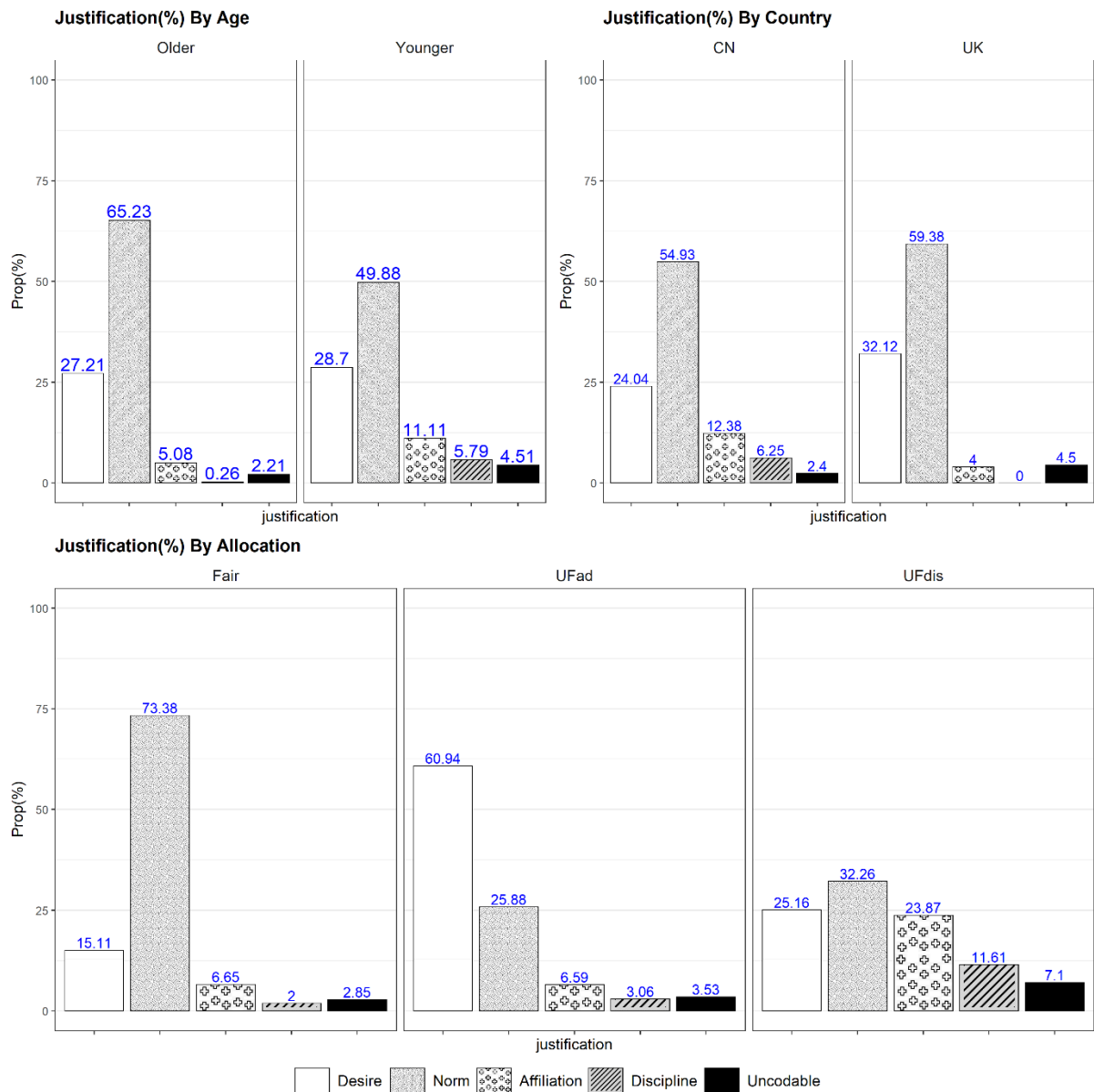
Note. The five types of justification are displayed on the x-axis including Desire, Norm, Affiliation, Discipline and Uncodable. The height of each bar with numbers represents the percentage (%) of each justification made.

3.4.2 Modelling

In order to understand whether children justify their allocations in terms of the manipulations performed, we conducted a multinomial logistic regression examining how the dependent measure, justification type, varied across the different types of trial. In such an

analysis, one level of the dependent measure (one justification category in this case) is used as a baseline, against which all others are compared. We selected Desire-based justifications for this purpose as they represent self-interested rather than principled justifications. These responses occurred frequently enough to act as a baseline (also known as 'reference level') (Browne et al., 2002). We compared these with the other justifications in terms of three participant characteristics (age group, country, gender), three experimental manipulations (cost, competition and relationship) and in relation to the three type of allocation that the child made (giving the other child more[UFdis] vs sharing equally [Fair] vs keeping more for oneself [UFad]). We included these factors only as main effects and their interactions with the type of allocation they made. No higher order interactions were modelled here as the focus was only the association between children's justifications and their allocations made in different conditions. The data were screened and no problems (multicollinearity, missing data) appeared to be present. Overall, the model was predictive of group classification, χ^2 (83) = 1070.3, $p<.001$, McFadden R^2 = .30, correctly classifying 73.16% of participants. The model was built in R through the '*nnet*' package (Ripley et al., 2016) using the following syntax:

model <- multinom(justification ~ age_group*allocation + country*allocation + gender*allocation + cost*allocation + competition*allocation + relationship*allocation, data)

3.4.3 Model Interpretation

Table 2 summarises the parameter estimates for the significant main effects and interactions predicting the type of justification given, by comparing each type of response with the baseline, desire. The table is divided into sections, grouping together related main effects and interactions. For example, section 1 addresses the analyses which refer to whether there are differences between the two age groups studied – the first hypothesis under

investigation. The results in section 1 show that age and its interaction with allocation significantly predicted variation in normative, affiliative and uncodable judgements. Each line shows the regression equation (β) in relation to the manipulation and its significance test. So, in Line 1.1 the main effect concerns the use of normative justifications and shows a main effect of age group. The flag 'age(Younger)' identifies the younger group as the baseline for that factor. That the effect is negative shows that the younger children were less likely to use normative justifications than desire based comments, providing support for our first hypothesis. In each case we calculated the levels of each factor and report this in the ratio scores calculated in the columns L1 (Level 1 or baseline) with L2, the comparator with that baseline. This shows in line 1.1, that 58 desire responses were found per 100 normative justifications in the younger age group, while the number was lower for the older group (42 desires per 100 responses mentioning norms). This effect was qualified by an age by allocation interaction. When they allocated more to themselves ('allocation(UFad)' in Table 2), as the allocation was unfair and they advantaged themselves), the younger children were less likely to provide a normative response compared to older ones.

Table 2

Justification Model Summary

Re.	Justification	Predictor (Baseline)	*B*	Std. Error	z-value	Pr(>|z|)	Sig.	L1	L2
1.1	Norm	age (Younger)	-0.65	0.19	-3.37	0.00	***	0.58	0.42
		allocation(UFad)*age(Younger)	1.03	0.34	3.02	0.00	**	1.98	2.83
1.2	Affiliation	age(Younger)	1.45	0.39	3.69	0.00	***	2.58	5.36
		allocation(UFdis)*age(Younger)	-2.27	0.70	-3.24	0.00	**	1.44	0.68
1.3	Uncodable	age(Younger)	1.44	0.56	2.55	0.01	*	6.36	12.29
		allocation(UFad)*age(Younger)	-2.03	0.80	-2.53	0.01	*	24.6	13.6
2.1	Norm	country(UK)	-2.16	0.24	-8.86	0.00	***	0.54	0.44
		allocation(UFad)*country(UK)	7.75	1.06	7.30	0.00	***	0.98	152
		allocation(UFdis)*country(UK)	3.58	0.56	6.44	0.00	***	0.41	1.56
2.2	Affiliation	country(UK)	-3.02	0.37	-8.26	0.00	***	8.03	1.94
		allocation(UFad)*country(UK)	3.03	0.57	5.32	0.00	***	8.92	9.5
2.3	Uncodable	country(UK)	-1.35	0.45	-3.01	0.00	**	7.14	10
		allocation(UFad)*country(UK)	2.69	0.76	3.53	0.00	***	9.73	38
		allocation(UFdis)*country(UK)	2.15	0.89	2.42	0.02	*	2.33	5
3.1	Norm	cost(NO)	1.07	0.19	5.60	0.00	***	0.25	0.86
3.2	Discipline	cost(NO)	1.28	0.51	2.54	0.01	*	5.5	12.56
4	Affiliation	relationship(Peer)	-0.75	0.32	-2.37	0.02	*	4.08	2.95
		allocation(UFad)*relationship(Peer)	2.03	0.54	3.73	0.00	***	5.35	19
5	Discipline	allocation(UFdis)*competition(NO)	-1.85	0.83	-2.24	0.03	*	3.43	1.36
6.1	Norm	allocation(UFad)	-9.50	1.16	-8.21	0.00	***	2.35	0.21
		allocation(UFdis)	-3.53	0.79	-4.48	0.00	***	0.78	0.21
6.2	Affiliation	allocation(UFad)	-2.99	0.76	-3.95	0.00	***	9.25	2.27

Note: * p < .05, ** p < .01, *** p <.001. L1 refers to the ratio of children's desire response proportion compared to the corresponding factor at the baseline level (Younger, UK, NoCost, Unknown Peer, NoCompetition, Fair) and L2 refers to the same but at the compared level of that factor (Older, China, Cost, Friend, Competition, advantage [UFad] or disadvantage self [UFdis]).

Younger children were more likely than older ones to mention Affiliation across all allocations unless they disadvantaged themselves. In such a context, compared to the older group, they were more likely to report desires (suggesting, for example, that 'the other child wanted more', Line 1.2). 'Uncodable' responses were also more often reported by younger participants. However, they tended to justify their self-advantageous allocations using desires rather than giving Uncodable answers (Line 1.3) – that is, they said they took more because they wanted to do so more than they did not answer or gave a response that was uninterpretable or unrelated to the conversation.

Section 2 in Table 2 allows us to test the second hypothesis concerning differences by country. There were three main effects and interactions with allocation. Lines 2.1-2.3 show

that British children were generally more likely to provide desire responses than normative justifications, affiliation responses and uncodable statements, when compared with Chinese children. However, these responses were qualified by the type of allocation that they made. British children who gave unequal allocations (either advantaging or disadvantaging themselves) used more normative justifications compared to trials where children made equal allocations (Line 2.1). British children also more often used desire over affiliation to justify their allocations compared to Chinese children (Line 2.2). However, when they advantaged themselves, they tended to do the opposite by reporting more affiliations (e.g., they justified their self-advantage by saying 'I don't know him'). When making unequal allocations, the few *Uncodable* responses were more often produced by British children, regardless of whether they advantaged or disadvantaged themselves (Line 2.3).

The results in Table 2 as a whole allow us to reflect upon the third hypothesis, that children's justifications will reflect the contextual cues which influence their allocations. This is examined particularly in the rest of the sections (Panels 3, 4 and 5). The three structural factors, cost, relationship and competition each produced significant main effects or interactions with how they justified resources. In trials where a fair allocation invoked no cost, children were more likely to refer to norms (Line 3.1) and discipline (Line 3.2) than to desires. Relationship only prompted increased affiliation justifications. When paired with an unknown-peer, children mentioned affiliation less and desires more. However, compared to being paired with a friend, children who advantaged themselves in the stranger conditions provided more affiliation responses than desire ones (Panel 4). Although competition was found not to be significant as a main effect, its interaction with allocation showed that children who disadvantaged themselves mentioned the other child's desire more than discipline when a trial was not a competitive one (Panel 5). Such justifications reflect the

occasional act of generosity to an unknown peer within the non-competitive context (i.e., wanting to help a stranger as opposed to believing they deserved it).

Finally, Panel 6 of Table 2 shows main effects resulting from how many items they allocated to each child. Children made fewer normative statements compared to desire justifications in both types of unequal allocation (advantaging and disadvantaging themselves) as shown by Line 6.1. Children referred to desires more than affiliation to justify allocations where they gained an advantage (Line 6.2).

3.5 Discussion

The patterns of justifications provided by this sample of young children allow us to reflect upon the development of the principle of fairness, especially in preschoolers, and how this is mediated by cultural and social-interactional processes. We found that two structural factors (age and country) and two of the contextual manipulations that were made (cost and relationship), had direct effects on how children justified their allocations. Indeed, these preschoolers distributed resources in ways that were clearly systematic. We will consider each of our three hypotheses in relation to these effects, but first we need to reflect upon the overall patterns of justifications in relation to previous studies, as this paves the way to understand the implications of these justifications.

The children across the age-range of this sample showed that they were capable of navigating their way through complex social interactions and provide justifications for their allocations based on these cues. As predicted, the social contexts that we devised led to greater numbers of responses that could be reliably coded. In the two key previous studies only 45.74% of kindergartens were reported to provide a codable response (Sigelman & Waitzman, 1991) and 23.53% of 3- to 4-year-olds answered justifications question correctly (Baumard et al., 2012). In this study, 96.81 % of justifications fit into one of four categories. This is in part a result of coding differences. As a result of the particular focus of each study,

Sigelman and Waitzman treated desire-related justifications as uncodable, while Baumard et al. focused primarily upon whether children used merit related justifications within a reward-for-work paradigm. In addition, the justification questions were asked differently in each study. Sigelman and Waitzman asked children "Why is that the fairest way?" after they had distributed resources. This clearly leading question could have caused children to doubt unequal allocations or the moral stance behind them. Baumard et al, on the other hand, simply asked children 'why?'. The brevity of this one-word question may not have helped the children to consider the allocations that they were supposed to justify. The justification question in our study was asked clearly in relation to the allocations made and in a neutral tone. As stated in the Introduction, we attempted to emphasize the neutrality of the justification probe. It may be the case that only a few of these children's responses were uncodable because they were asked non-judgemental questions about decisions they had made about manipulations which were relevant to the child's experience.

Age The modal response was one based on fairness, particularly in relation to equal allocation by the child. At the same time, in support of our first hypothesis, we found an age shift in responses within the age range 3-6 years. The older children (5-6-year-olds) provided more normative justifications than the younger children, but they also adapted their justifications to suit the contextual demands. The younger age group used normative language less than their older peers, and displayed greater flexibility. For example, they used affiliation, discipline and desire responses when they made fair allocations. or cited fairness as a means of accounting for selfish allocations. This appears to complement recent suggestions that a major achievement of the elementary school years is the ability to conceal the desire to act in a selfish manner (Shaw et al., 2014). Our results add to this literature by showing that children may at times use linguistic strategies to defend selfish allocations by invoking normative claims that it is "the right thing to do".

Culture In support of our second hypothesis, we found clear cultural differences in how children justified their responses. While there was no variation in the absolute numbers of normative justifications, the British children used a relatively higher proportion of desire-based accounts. Even when they gave more to the other child, British children often responded, 'I just want to do that'. They also used normative judgements when allocating unequally. For example, we observed 109 normative responses in British children in relation to their advantageous allocations but only 1 such response in Chinese children. By saying that taking more 'is the right thing to do', some British children appeared to justify inequality occasionally by normalising it. This is especially the case with younger British children. Compared to the same age group in China, these participants made 3.5 times more normative responses across all trials. This may reflect a difference in the developmental stages of how younger children learn fairness in each culture. Both groups appear to practice norms by applying them, but in ways that appear to be culturally stamped. Similar moral principles appear to be emphasized differently in eastern and western societies (Chernyak et al., 2013). As stated earlier, British children trend to set their own rules instead of following social rules. Western cultures are reputed to show greater tolerance for counter-normative behaviours and individual expression (Mrazek et al., 2013; Oyserman et al., 2002), while Eastern cultures tend to place greater weight on social conformity (Gelfand et al., 2011; Mu et al., 2015). Moreover, this development based on personal experience may also require a longer time to emerge for the child to master the concept of fairness. Unlike Chinese children who were able to clearly justify their decisions, older British children provided 2.5 times more uncodable responses. Generally, our Chinese children more readily applied normative and affiliative justifications across trials, while British children's mixed usage of norms and desires and greater usage of uncodable responses might reflect greater difficulty in their balancing of personal interests and the pressure to conform to rules of fairness.

There may be clear pragmatic reasons for these 'cultural' variations. For example, the different school sizes in China and the UK may account, in part, for these differences, particularly the predominance of normative Chinese responses. The preschools we visited in the UK normally have about 50 children while the number was four times greater in China. It is highly likely that larger class sizes, within a more bounded physical space, require clearer and stricter discipline to allow a class to function smoothly. As has been shown in cross-national comparisons, Chinese preschools follow a strictly organised routine and rules are adhered to meticulously (Tobin et al., 1989). This apparent organizational difference also leads to an interesting phenomenon that we discuss next.

Discipline We found that no British child used discipline-related responses to justify their allocation, while a few Chinese children did. More interestingly, most of these Chinese children were from the younger group, within the first year of their preschools. This difference may reflect variations in the perception of norm enforcement, which is emphasized in more Chinese schools. In China, teachers are keen to teach behavioural rules and foster good conduct in preschoolers (Xu, 2014). These younger Chinese children were especially considered by their teachers to be at the critical stage of their schooling in terms of learning school rules and cultivating good behaviours. Asian children are reported to take moral disputes more seriously and view moral violations as actions they "cannot" and "should not" engage in. Though also true for western children, studies suggest they are more likely than children from Asian countries to elevate their own interests above normative standards of conduct even with regards to moral rules (Chernyak et al., 2013; Zhao & Kushnir, 2019). The above results indicate interesting cultural variations, especially within a such broad age group. Future research should examine possible culture by age interactions in greater depth, for example, by exploring children's justification of resource sharing in contexts where norm enforcement is more or less likely.

Social Contexts Addressing our third hypothesis, we know that that children's allocations vary according to the various social contexts presented in the tasks deriving from Dictator Games, but this study provides the first direct evidence that preschoolers' justifications are influenced by multiple and interacting social factors. As Figure 2 shows clearly, they tend to make normative references when sharing resources with others but their allocations and justifications can be altered in systematic ways. For example, their references to affiliation when allocating resources to a friend compared to an unknown peer echo previous findings of an early in-group member preference particularly when they make more generous allocations towards the friend (Over, 2018; Shaw et al., 2012). Children seem to grasp early in development that friendships reflect social commitments to reciprocal exchanges of goods and services, based on past interactions (Engelmann et al., 2019; Majolo et al., 2006; Seyfarth & Cheney, 2012). Our results suggest that they adhere, in part, to an 'affiliation principle' to guide their judgements with particular recipients.

Numerical Competence What might explain such variation in children's justifications cross different trials? Some authors have argued that children's adherence to fairness principles may be cognitively driven. For example, it has been recently suggested that numerical competence is one possible mechanism underpinning fairness conduct (Chernyak, et al., 2016; Chernyak, Harris & Cordes, 2019). Being able to recognize the numbers of resources that are manipulated in the game can provide useful information to facilitate children's decision making. However, the dynamic shifts between social contexts in the tasks conducted here suggest that a purely cognitive explanation may not be sufficient. The flexibility that children employed in using relevant contextual principles partly explains how they justify their fairness decisions. Indeed, the strains shown between fairness and desire-based thinking and the fact that the latter was evident in one quarter of justifications may

suggest that resolving these tensions is not simply the product of an ability to count or make simple comparisons between quantities.

Reputational Strategy The shifts in justification between different types of trial suggest that children's justifications are, in part, mediated through their social interactions, either real or anticipated. For example, their references to affiliation became accentuated when the recipient was an unknown peer, particularly when children advantaged themselves in this context. They often defended such self-interest by saying "because I don't know him/her" as if this was a sufficient explanation. In such a context, this affiliation defence may offer a reputational strategy, by obfuscating desire as the true motive for self-interest. This finding is in keeping with previous research which shows that four-year-olds are starting to show that their sympathy for a peer influences their ability to share resources with them (Ongley & Malti, 2014). However, when there is lack of interpersonal bonds, as is the case with an unknown peer, children may feel less guilty for violating fairness. Similarly, even three-year-olds are more prosocial in dictator game contexts when they have empathic concern for the other – if, for example, they are told that her dog has gone missing (Williams et al., 2014) or the recipient is poorer than them (Wörle & Paulus, 2018). The main effects and interactions involving the relationship factor suggest that young children easily empathise with a close friend compared to a stranger and, of course, children are more accountable to their classmates than a stranger. Therefore, it is not surprising to find that children made fair or even advantageous allocations toward a friend and then justified themselves with kindness, e.g. 'because he/she is my friend'.

3.5.1 General Conclusion

Taken together, our results suggest that the formation and justification of children's fairness principles emerge earlier and more flexibly than research into children's allocations and justifications has previously suggested (Blake et al., 2013; LoBue et al., 2011; Schmidt et

al., 2016). When the social context is relevant to the child and the task straightforward enough they appear able to evaluate and employ simple social cues, like the cost of sharing or the competition for praise, to guide their judgements. As a result, the data from this study add to recent analyses of preschoolers' abilities. Following a series of studies in which they watch activities and extract the rules (Rakoczy, et al., 2008), children have been shown to develop normative principles quickly. They even correct an adult who deviates from a rule that has been demonstrated only a few times (Schmidt et al., 2016).

Schmidt et al. suggest that 3-year-olds are "promiscuous normativists", as witnessed in over half the justifications by participants in this study. However, this is not the only consideration that children displayed here. That they systematically varied their assessments of each setting shows that children can balance normative rules against their own desires on one hand and against principles of affiliation and discipline (compensation for prior good or bad behaviour). These latter influences are likely to reflect the child's developing commitment within close friendships (Dunn & McGuire, 1992) and negotiations with peers (Bigler et al., 2016).

Furthermore, this study provides support for the use of both qualitative and quantitative measures to capture children's grasp of fairness. Most previous studies have focused on how children allocate resources or whether they judge another distributor as fair or unfair, namely following the economic game paradigm (Forsythe et al., 1994; Güth et al., 1982). Only a few have used qualitative data and these have done so mainly to learn more about participants' reaction to, and feelings about, the allocations that have been made. We asked children explicitly to justify their decisions, allowing them to articulate the principles that they apply in particular settings. As Figure 2 shows, the patterns of justifications for fair, advantaged, and disadvantaged allocations appear to vary intelligently in relation to the decision that the child had made. For example, affiliation was invoked more when giving

more to the recipient or when favouring a friend, desire was invoked when taking more, while in the main norms were invoked for fairness). Thus, the results speak to an alignment between justifications and actions. Children's justifications do not show the tell-tale signs of "post hoc rationalizations" (i.e., a misalignment between the principle/factors actually guiding their action and the principle they report that is guiding their action) (Cushman et al. 2006).

3.5.2 Limitations and Future Research

We did not receive permission to record the experiment, so we could not code more pragmatic features of the child's communication. However, the patterns of results reported here underline the potential benefits to be gained from questioning children and coding their justifications appropriately. We elicited children's justifications repeatedly across 8 trials. These were randomised but there may have been some carry-over effects that we could not identify. Further research should use single trials per child or examine carry over effects more closely. However, given that the randomisation of trials did not wipe out specific connections between the types of allocation made or the justification given, we feel that these pre-schoolers coped well with the repetition showing greater considerable sophistication in their understanding. Our results seem to suggest that preschoolers strive to balance a desire for personal gain which is highlighted when sharing means they might lose against a commitment to equity, affiliation and other attributions, such as discipline.

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3.7 Appendix 1

Figure 1

Justification Distribution by Age Group in Chinese Children
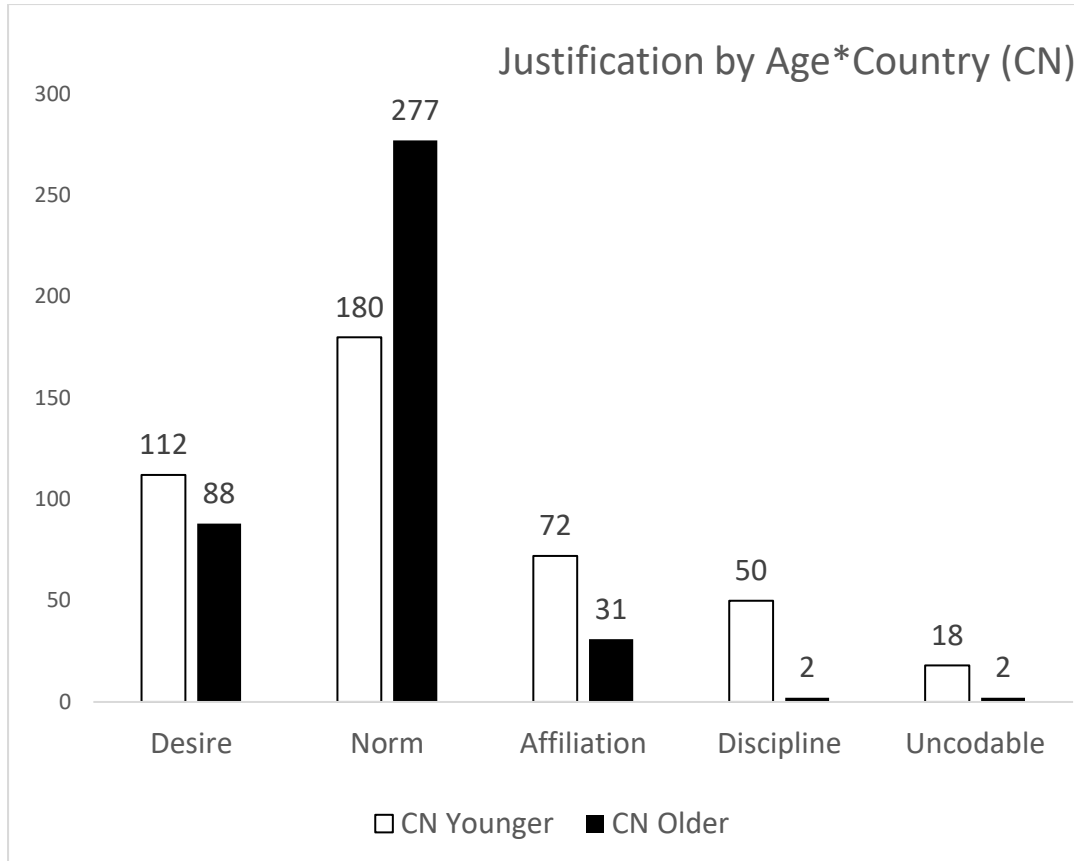
Figure 2

Justification Distribution by Each Age Group in British Children
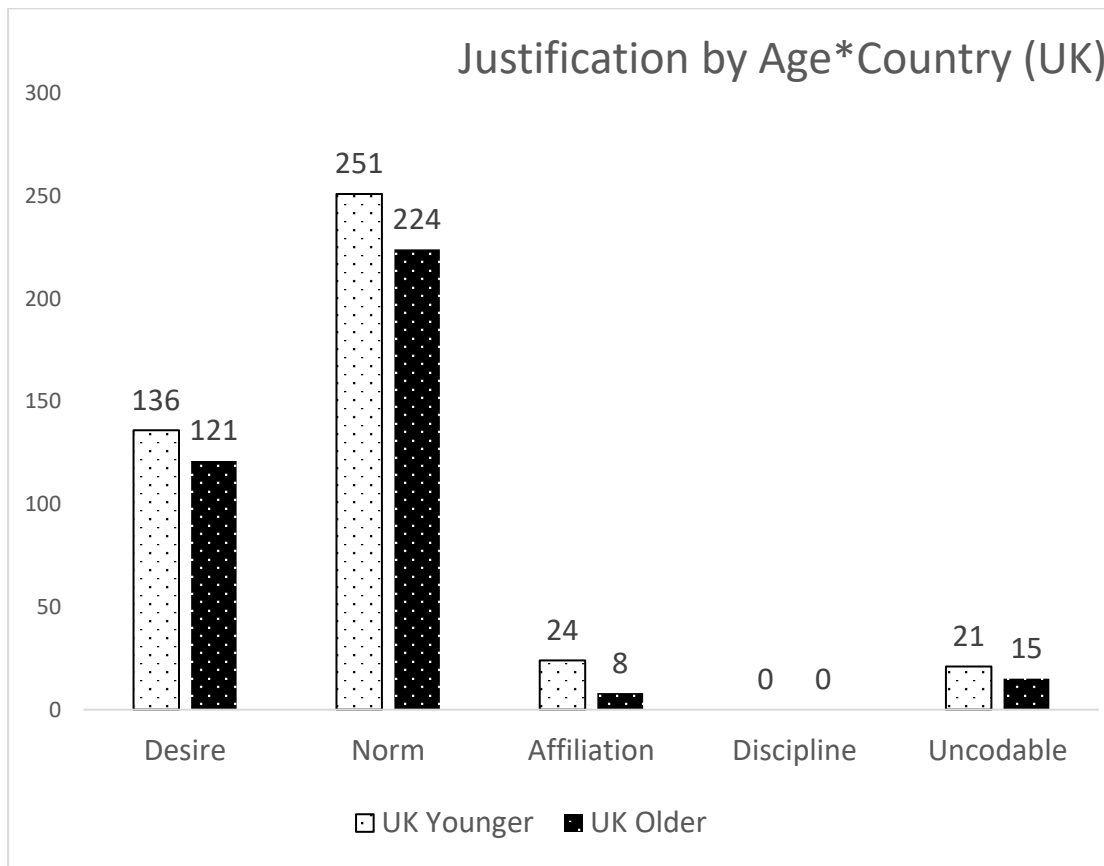
Chapter 4: Authority in Fairness Understanding

Social influences on children's allocations of resources: How British and Chinese Children Respond to Unequal Treatments from Different Authority Figures

Research Highlights

- The influence of authority on younger children's fairness understanding is examined in relation to cultural and developmental variances .

- 3- to 7-year-olds judged and justified uneven distributions from a teacher, an unfamiliar adult and a puppet differently.

- Although children showed more acceptance to their teacher, they questioned the legitimacy of all distributors when they received less.

- Children did not only focus on their desires in justifying the received allocations, they made difference references, particularly to generosity.

Keywords

Authority; Fairness Understanding; Fairness Principles; Cultural difference; Development Difference; Social Pressure

4.1 Abstract

Young children learn fairness rules through their surroundings and this learning experience is largely contextually dependent. Although their interactions with others who are with superior power or knowledge, e.g. their parents or caregivers, have been shown to play a vital role in the early moral development, we know little about how authority figures affect children, practically in understanding and adopting social norms. We analysed 197 three- to seven-year-olds from China and the UK to make judgements about uneven allocations (either advantageous or disadvantageous to themselves) that they received from three authority figures in their respective settings, including their teacher in a school, an unfamiliar adult in a commercial place and a puppet in both settings. Then, they justified their decisions in relation to fairness and morality. Results from three multinomial logistic regression models suggested that although children trended to agree more with an authority who was ranked higher by society, they were more likely to protest when they were treated disadvantageously. Chinese children who were more compliant to authority, made justifications based on generosity more than authority when they were disadvantaged compared to their British peers. The diversity found in children's justifications show how developmental change occurs, with older children drawing more from diverse sources of information to uphold fairness.

4.2 Introduction

In early childhood children are faced with three related problems that they need to come to terms with: 1) equality expectation, 2) inequality aversion and 3) norm enforcement. They seem to prefer norms of equality from toddlerhood (Sloane, Baillargeon & Premack, 2012) and this develops into a norm of fairness which children increasingly adhere to (Sommerville et al., 2013). At the same time they have what is termed an inequality aversion (LoBue et al., 2011; Williams & Moore, 2016) which emerges slightly later. Thirdly, different social norms are absorbed into their social interactions so that they correct people who do not follow rules that have recently been observed (Huppert et al., 2017). In this paper we explore the possible cultural variations in processing social information, which lead to a deeper understanding of these unique developmental patterns. Furthermore, while social influences on children's fairness judgement have been widely studied, one particular factor, authority, plays an essential role in enforcing norms but has been overlooked. We explore this role in terms of its interaction with culture. This study will investigate the effect of different authority figures on British and Chinese children's fairness judgement and justifications, in a paradigm in which the child receives either a greater or lesser allocation of a reward from such a figure.

Young children learn social norms through social interactions (Warneken & Tomasello, 2007), and even two-year-olds follow and enforce rules after observing an agent conducting a novel action on an object (Hardecker & Tomasello, 2017). Three-year-olds treat the person who demonstrates an action as an authority, so protest when another agent transgresses by performing another action with the same apparatus (Hardecker & Tomasello, 2017; Rakoczy, Warneken, & Tomasello, 2008; Schmidt, Rakoczy, & Tomasello, 2012; Wyman, Rakoczy, & Tomasello, 2009). These data suggest that 2-year-olds' protest is primarily an imitation of an adult's behaviours employing imperative commands (e.g., 'Don't

do that'), while three year olds have developed principles through these practices, using normative sanctions (e.g., 'That's wrong'). This imitation is a necessary step for young children to establish a better understanding of norms. It facilitates further conceptualization of these rules that children learn from previous experiences. The benefits of imitation in learning social norms are also suggested by many other researchers (Carpenter, Akhtar, & Tomasello, 1998; Gergely & Csibra, 2006; Meltzoff, 2007).

The studies cited above tend to employ an unfamiliar adult, usually a second researcher, who the child has just met, or even someone sitting at an adjacent table who the child watches casually (Schmidt et al., 2016). Yet even such people take on the status of authority figure who children follow closely and take their actions to display norm enforcement. This is perhaps not surprising as parent-toddler interactions involve repeated incidents of conflict and discussion about norms and the moral consequences of transgression, and that occurs more often in the home than the laboratory (e.g. Laible & Thompson, 2002).

At the same time that children come to correct others who breach apparent norms, they strive, sometimes unsuccessfully, to act equitably when either dividing resources between themselves and another person or judging whether or not a division of rewards is 'fair'. Some research suggests that preschoolers tend to divide resources equally (e.g., Damon, 1975; McCrink, Bloom & Santos, 2010), while in some circumstances the desire for greater rewards is too great (Olson & Spelke, 2008; Thomson & Jones, 2005). Thus, it seems timely to examine this age group's evaluations of the division of rewards under a greater variety of social circumstances, including the authority of the person dividing the rewards.

4.2.1 Authority Attribute

Children's understanding of authority seems to involve complex social-cognitive judgements (Laupa, Turiel, & Cowan, 1995). They differentiate between people issuing instructions by evaluating the attributes of the authority figure in terms of their relevant knowledge and social power (Buzzelli & Johnston, 2001; Laupa, 1994; Laupa & Tse, 2005). Priority is given to an adult authority first, then to a peer authority and an adult without authority (Laupa & Turiel, 1986). Furthermore, an authority's legitimacy has an embedded feature, the setting. Parents, especially mothers, are understood as important as teachers in relevant settings. Mothers have authority at home setting, while teachers have this in school (Yau, Smetana, & Metzger, 2009). We will focus on teachers in school as authority figures.

Our first aim is to test children's responses toward different authority figures who distribute unequal numbers of resources to themselves and a peer. From the above findings, a teacher represents the high level of authority and to increase this likelihood we ask the child to consider their own teacher's allocations. We compare this with a puppet within one control condition to minimise the authority effect. Puppets have been used as a medium for encouraging and facilitating interactions within adult–child dyads with young children who regard them positively (Korošec, 2012, 2013). Their attractiveness also makes the delivery of information easier (Kröger & Nupponen, 2019). In between, we examine children's assessments of the allocations of an adult who has some authority, by virtue of being an adult, but not one that is in loco parentis. We selected a baker or shop assistant. Each figure will be presented in their relevant settings to protect their legitimacy, a school, or a shop and a puppet in either location. Hypothesis 1 predicts that children will accept a teacher's allocation of resources more than they will an unfamiliar adult or puppet and use authority to justify their responses.

Apart from evaluating the attributes of the authority figure, children are also influenced by the event domain that plays an essential role in children's evaluations of the permissibility of authority according to the social domain theory (Tisak, 1986: for a recent summary, see Smetana, 2013). Accordingly, children assess authority using the following three domains: moral events, social-conventional events and personal events (Nucci, 2001; Smetana, Campione‑Barr & Daddis, 2004; Milnitsky-Sapiro, Turiel & Nucci, 2006).

Morality hypothetically refers to events that are obligatory, universally applicable, impersonal, and normatively binding. It is based on concepts of welfare (harm), fairness and rights that children especially valued in their decision making. (Helwig et al., 2003; Turiel, 2008; Smetana, 2006). Moral events therefore provide an opportunity for us to investigate authority beyond merely imitating or accepting someone's judgement.

4.2.2 Authority Legitimacy

As stated above, our second manipulation is to present children with unequal allocations. These constitute moral transgressions and we use them to assess the effect of two types of 'treatment' on children's fairness judgement and justification. We will compare advantageous inequality (AI: receiving two items to the other's one) and disadvantageous inequality (DI: receiving one item to the other's two) in order to capture children's responses to different treatments. Although strong inequality aversion develops with age, rejecting AI is always harder compared with DI (Helwig et al., 2003; Turiel, 2008; Smetana, 2006). Therefore, we hypothesize that DI will trigger more protest, with increased reference to normative concerns, whilst children will accept AI more easily, referring to their desires in justification. We will explore whether the donor's status will influence children's norm enforcement, questioning of the distributor's legitimacy or acceptance of their own fulfilled desires.

We thus predict an interaction between authority attributes and event domains in qualifying children's judgement of fairness (Hypothesis 2). The legitimacy of authority (e.g., an adult designated as teacher in a school) within one event domain does not guarantee its acceptance in others (e.g., an adult who serves you in a shop) (Laupa & Turiel, 1993; Tisak et al., 2000; Tisak & Tisak, 1990; Tyler, 2006). As the research on social norms suggests, preschoolers quickly learn the way ''we do things'' (Rakoczy & Schmidt, 2013). They may also identify moral transgression as more serious than social conventional violation (Göckeritz, Schmidt & Tomasello, 2014; Smetana & Braeges, 1990) and view authority as legitimate only for acceptable behaviours (Nucci & Weber, 1995; Tisak, 1986; Padilla-Walker, Nelson & Knapp, 2014). For example, children obey their parents' commands on cleaning but not stealing, prioritising commands which ensure fairness, welfare and preventing harm (Killen, 1990; Laupa, 1994; Laupa, Turiel & Cowan, 1995; Zhao & Kushnir, 2018). We therefore predict that upon receiving DI from a puppet rather than a teacher or even an unfamiliar adult, children will be more likely to argue that they are both 'wrong' and 'unfair', citing normative considerations.

4.2.3 Cultural Difference

We explore to what extent children's judgements of fairness and morality are culturally grounded. Social norms that children pick up are influenced by local practices and their social identification as a group member (Henrich & Henrich, 2007; Tomasello, 2016; Tomasello, Kruger & Ratner, 1993). However, ultimatum and dictator game data on children come primarily from western participants (for an exception see Mei & Lewis, 2021[Chapter 2]). In such cultures, strong protest about moral transgression, discussed above, occurs as individualist societies place more stress on individual autonomy and democracy (Darwish & Huber, 2003; Shweder, Mahapatra & Miller, 1987; Triandis, 2001). Equality is shared among persons and challenging an authority is acceptable, and even encouraged.

Collectivist societies are reputedly quite the opposite. They stress harmonious interrelatedness (Chao, 1995). For example, traditional values of interpersonal relationships, harmony, and cooperation in China are strongly supported even now (Croucher et al., 2016; Gabrenya & Hwang, 1996; Oyserman & Lee, 2008). Obligations of obedience to authority are built upon early secure attachment relationships with parents (Xiao, 1999) and lead to respect for school authorities. Therefore, early childhood discipline is prioritised in China. Starting at home and continuing at pre-school, young children are disciplined for breaches of obedience and compliance and are expected to learn strict social norms from adult models (Yau, Smetana & Metzger, 2009; Wang & Hsueh, 2000; Yau, 2007). Chinese children are socialized to respect adults and their knowledge. They are required to act or stop according to adults' commands (Wu, 1996) so that they can develop self-restraint and compliance (Chen et al., 2003). Growing up in such a culture, which emphasizes obedience to authority (Lau, 1996) and observance of class rules (Wang & Mao, 1996), many studies have found that Chinese children show a higher rate of acceptance of authority than children from western cultures (Smetana et al., 2014; Yau, Smetana & Metzger, 2009).

How the above cultural principles on authority influence everyday interactions, especially children's grasp of fairness, is the third focus. We attempt to explore how children from two different cultures judge and justify different treatments regarding fairness and the moral implication of uneven division. Given the more hierarchical familial structure and historical tradition of filial piety in China, we expect to find a stronger support for adult authority than in the West. We hypothesize, thirdly, that British children will be more likely to reject and report the wrongness of unfair treatments from all authority figures. Chinese children, on the other hand, will be more compliant with teachers and agree to their distribution.

4.2.4 Developmental Effect

According to previous research, especially during their preschool years, children start to understand that doing something the right way constitutes a social norm (Kalish, 1998; Smetana, 1981; Smetana, 1983; Tomasello & Vaish, 2013), and they learn to enforce these norms when they encounter norm violators (Casler, Terziyan, & Greene, 2009; Köymen et al., 2014; Rakoczy et al., 2009; Rakoczy, Warneken, & Tomasello, 2008; Schmidt, Rakoczy, & Tomasello, 2012). This is also the starting point at which children start to draw boundaries around the legitimacy of authority. Children as young as three years are capable of distinguishing moral from social-conventional events (Smetana, 2006; Turiel, 2008). From the age of 5 or 6, children are reported to have formed some adult-like moral principles (Fehr, Bernhard & Rockenbach, 2008). This developmental shift also applies to children's inequality aversion. Whist children younger than 5 struggle to reject advantageous allocations, 6- to 8-year-olds even discard resources to ensure equality (Shaw & Olson, 2012). Therefore, to examine the influence of authority on developmental shifts, we will focus on children between the age 3 and 7 years who are experiencing this crucial transition and age five seems to be the turning point. Our fourth hypothesis is that we expect to see children older than 5 (we divide children into two year groups within each educational system) are more likely to take a moral stance rather than simply following authority to make decisions, while younger preschoolers, specifically, will assess unequal divisions of spoils as 'unfair' but will not necessarily identify this as being 'wrong'. We therefore ask children questions about both the fairness and morality (right or wrong) of such a division. Capitalising upon recent research on young children's justifications (LoBue et al., 2011; Mei & Lewis, 2021[Chapter 2]; Schmidt et al., 2016), we also ask children to justify responses to these questions in order to obtain a more complete grasp of their understanding.

In sum, in this study we test how children adjudicate on the two types of allocation of a surprise treat, identified as AI and DI above, in relation to four hypotheses concerning, respectively, who the distributor is ('authority'), the setting (the familiarity of school vs a shop), the child's culture (China vs the UK) and across the age span (3-7 years) when we expect developmental change. Given the complexity of the design we decided to concentrate our analyses of children's assessments of fairness and 'rightness' examining particular interactions: the two-way effects of authority with allocation, setting, culture, and age group, and the three way interaction between authority, culture and the type of allocation. Our interest in this single three-way interaction was specified above.

4.3 Method

4.3.1 Participants

197 typically developing children from each of China (*N*=100) and the UK (*N*=97) were tested by the first author individually in a quiet room in their preschool. Both samples consisted of a younger group (3 to 5; 2 [i.e. 5 years 2 months old], *M*=4 Yrs 8 Months, *SD*=5.3 Months, N_{male}=53, N_{female}=46) from two classes in a Chinese nursey or preschool in the UK and an older group 5 Yrs 3 Months to 7 years (*M*=5 Yrs 8 Months, *SD*=4.1 Months, N_{male}=52, N_{female}=46). All the British children were in the reception year in primary school, except 10 who were preschoolers later in the academic year.

This research was approved by the Faculty of Science and Technology's Ethics Committee at Lancaster University. Participants' parents in the UK provided written consent for their child's participation. Chinese parents gave verbal consent to the researcher or the teachers during or after a meeting with the researcher in which the study was described and discussed. Written consent was provided by the preschool principal. During testing, children's willingness was also respected.

4.3.2 Materials and Design

Participants were presented with six sets of drawings presented on an iPad to illustrate different stories. The stories are summarised in the appendix. Each referred to one of three authority figures (teacher vs cleaner/baker vs puppet) in one of two settings (school vs shop) and two types of distribution of rewards (advantageous vs disadvantageous to the child). In each trial the division was always three rewards (e.g. strawberries). Table 1 summaries the design. Key objects (the authority figures, the settings and the rewards) were all illustrated in the pictures except trials that involved a teacher (see Figure 1 for an example scene in which a baker has three extra cupcakes to distribute to the participant and another child). Following piloting, no pictures of teachers were used so that children could naturally refer to their own teacher, although a picture of a stereotypical school was shown to them. The puppets were also paired with the participant's gender.

These pictures were displayed with no background to eliminate possible distractions. All trials were presented on the online survey platform, Qualtrics. Authority figures were presented randomly while each of the treatments (the child receives one vs two items) was presented in a counterbalanced order.

4.3.3 Procedure

Children were tested in a quiet area (the book corner) near their classroom. At a table, each participant sat next to the researcher and completed all 6 trials on an iPad. First, participants were told each brief story involving themselves and shown the allocations made by each authority figure (either 2:1 [2 for participant and 1 for the other child] or 1:2). After each allocation, children were asked a series of questions to justify their fairness and morality judgements.

Table 1

Study Design

Country	Age	Gender	Authority	Setting	Treatment	Judgement	Justification
UK	Younger	M	Un-familiar Adult	Shop	Ad (2:1)	Fair-Right	Authority
					Dis (1:2)	Unfair-	Desire
			Puppet	School	Ad (2:1)	Wrong	Norm
					Dis (1:2)	Fair-Wrong	Generosity
CN	Older	F	Teacher	Shop	Ad (2:1)	Unfair-Right	Uncodable
				School	Dis (1:2)		

Notes. Ad = Advantage; Dis = Disadvantage. The underlined level of each variable is the defined baseline for the regressions (see Results). Justifications were made with references to fairness and morality respectively.

The following is an example of the scenarios presented to the participants: *'This is a Bakery opened recently near to your home. The baker in the shop is giving away free cupcakes. She has 3 left* (as shown in Figure 1A). *The baker gives you 2 cupcakes and gives another boy [girl] who came into the shop the other one* (as shown in Figure 1B)*'.*

Figure 1

The Authority's Unfair Treatment

Note. Picture A illustrates that a baker has three cupcakes to give away. Picture B illustrates that the participant receives two cupcakes on the blue plate and the other child receives the remaining one.

After presenting each scenario to the child, they were asked a control question first to ensure they understand the story: *How many [Items] did you get from the [authority figure] in the story?* All children answered each control question correctly. In every trial, two sets of test questions were asked. Fairness judgement was assessed first: '*Is it fair or unfair that P [the teacher/ baker/shop assistant/puppet] gave you [N*item(s)] and gave the other child [N*item(s)]?,* with a follow-up justification probe: '*Why do you think it is (not) fair?'.* The second set of test questions regarding morality was presented next following the same procedure, except the changes to each question: the phase *'right or wrong'* replaced *'fair or not fair'.*

4.3.4 Scoring System

Table 2

Fairness and Morality Justification Coding Scheme

Code	Category	Definition	Examples
1	Desires	explicit mention of satisfying one's own desires or imposing own desires on the others;	e.g. I like [the item]; I want to have more;
2	Norms	explicit reference to a standard of being fair, equal, kind, or other moral rules;	e.g. this is unfair; that's how it (the allocation) should be; I have more/less than [the other party]
3	Authority	explicitly refers to the authority's status or associated duties:	e.g. she is the teacher; he is an adult; She made the cupcakes; the teacher is in charge of giving cookies.
4	Generosity	statement about being kind and generous to the recipient	e.g. we need to share; I like to share; it's ok for [the recipient] to have more; [the recipient] can have more.
5	Uncodable	responses that did not belong to the above, insufficient information to be coded;	e.g. I don't know; participants didn't answer the questions or gave irrelevant answers.

In order to examine the consistency of children's fairness and morality understanding, we extracted three measures from the four questions. First, their answers to the two fairness and morality binary judgement questions were combined into one categorical judgement measure: Fair-Right, Fair-Wrong, Unfair-Right, Unfair-Wrong. Children's answers to the two justification questions (fairness and morality) were coded separately, to provide sufficient understanding of the rationales behind their judgements based on the scheme presented in Table 2. We started with four categories: desires, norms, authority and uncodable. The first two are common reasons that children refer to in resource allocations (McAuliffe et al., 2013; LoBue et al., 2011; Schmidt et al., 2016). We added Authority as the category at the core of our research design. However, generosity was later added into the scheme as it was mentioned sufficiently frequently during testing. The category Uncodable covers situations that do not belong to any of these definitions and usually referred to 'don't know' responses. Four children also provided responses concerning their health, for example, 'it's not good for you to eat too much ice cream'. Due to the small number of this type of justification, they were excluded from the final analysis.

4.4 Results

All the analyses conducted are accessible on the Open Science Framework (https://osf.io/9w483/?view_only=e56a857e5f244ad182a0b8522eaf6b2a). We started by exploring the distributions of the 2364 judgements and justifications. The children produced: 34.33% *Fair* judgements that they also considered to be *Right,* 31.26% *Unfair* judgements that they felt were *Wrong*, 20.61% were assessed as *Fair* but also *Wrong* and 13.80% were *Unfair* and *Right* responses.

Figure 2

Fairness and Morality Judgement Distribution
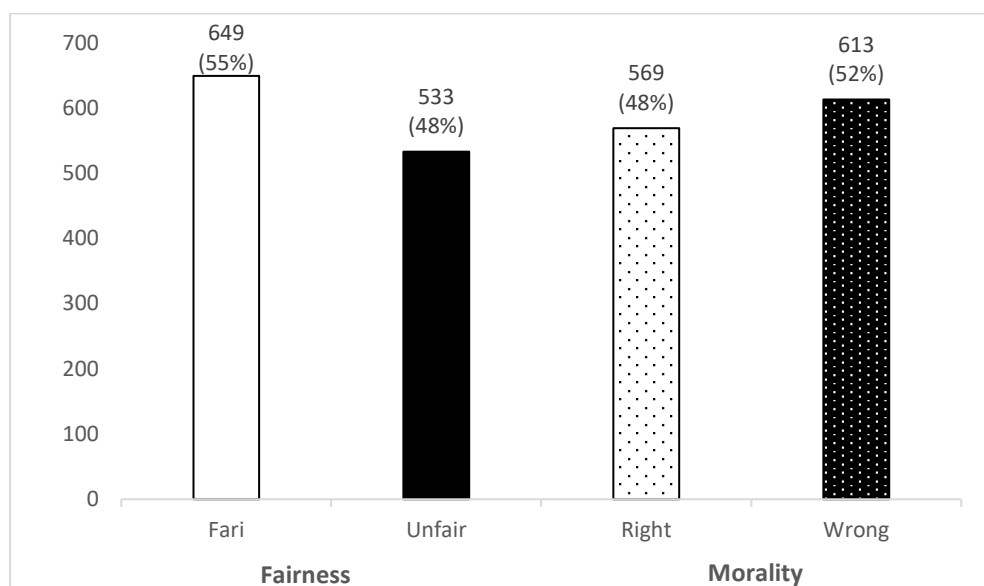
4.4.1 Modelling

Despite the various manipulations presented in the study, some children made the same fairness judgments across all trials. Sixty percent of Chinese children made the same decision over the six trials, with 37% considering all allocations as 'fair' while 23% stated they were 'unfair'. Only 21.65% of British children gave the same response about fairness across all the trials (12.37% 'Fair' and 9.28% 'Unfair'). The difference between cultures in those who gave consistent fairness responses was significant (χ^2 (1, $N = 197$) $= 29.91$, $p < .0001$). When analysing their morality judgements, the tendency to make same judgements across all trials persisted. Sixty-six percent of Chinese children always said 'right' ($N=31$) or 'wrong' ($N=35$) across all trials. The flexibility in British children again was high, in which 41.24% of them gave the same judgements. Eighteen of these stayers said 'Right' to all trials and 22 considered all allocations as being 'Wrong'. The full details of these stayers can be found in Figure 3. Comparing the use of same or different morality judgements, there was significant differences between the two countries, χ^2 (1, N = 197) = 12.15, p < .001, with more stayers in the Chinese sample.

Figure 3

Stayers' Judgement Distribution in China and UK
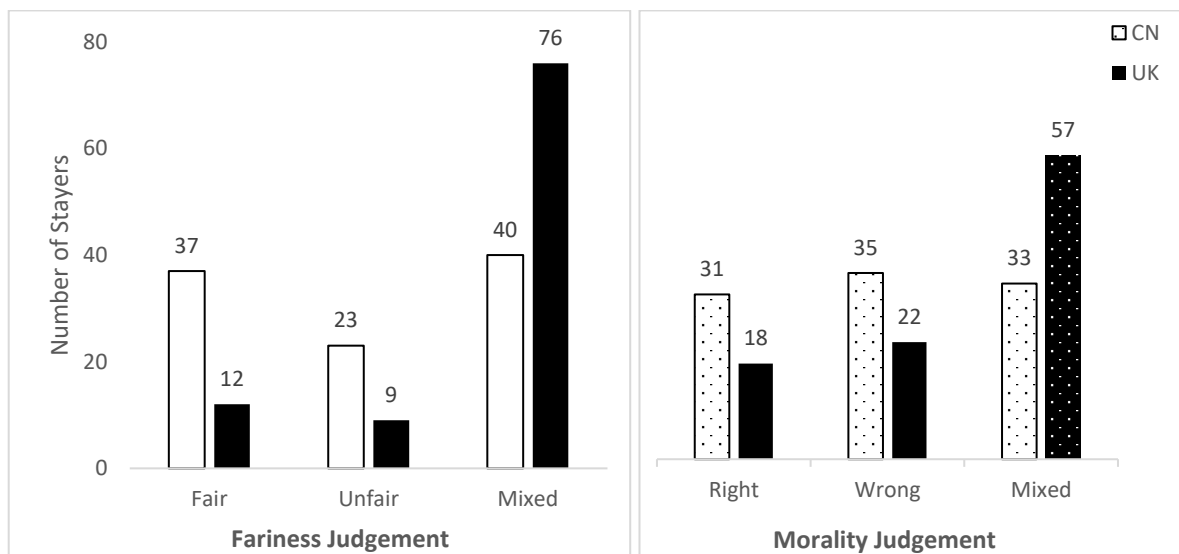
We next explored our four research questions: the influence of different authority

figures (<u>adult </u>vs teacher vs puppet) with 1) different treatments (Advantage [Ad] self vs

Disadvantage [Dis] self), 2) culture (<u>UK</u> vs China) and the interaction between these two

factors, 3) and the developmental shift (the <u>younger</u> vs the older group) on children's fairness

and morality judgements and justification. In order to answer our four research questions, we

examined these factors in relation to age group, country and gender as between-subject

factors and two repeated measures (authority and treatment). The data were analysed using

multinomial logistic regressions through the 'nnet' package in R (Ripley et al., 2016). The

underlined levels of each variable listed above were the baselines (also known as the

reference level in other types of design) for the modelling, with which all the other levels

were compared.

To test whether the numbers of children who did not change their responses from one

trial to another influenced the models, the data were firstly analysed without these stayers.

The results were identical to those when all data were included, so we report here the

analyses for the whole dataset. A preliminary regression model involving gender as well as

the effects identified below revealed no significant effects of gender in children's judgements, so this variable was excluded from subsequent analyses.

Two models assessed responded to the judgements of 'Fairness' and 'Morality', using binary logistic regression as the dependent measure was whether the allocations were fair/unfair or right/wrong. In these 'Judgement Models' the two way-interactions with authority, and single three-way interaction (authority*treatment *country) were included as predictors of each measure. The baselines for the dependent variable were that the allocation was, respectively, '<u>fair</u>' or '<u>right</u>'. An example of the model syntax is as follows:

Dependent variable~

treatment*authority+country*authority+age_group*authority+authority*treatment*country

4.4.2 Judgement Models (Fairness and Morality)

Table 3

Summary of Fairness and Morality Judgement Models

	Predictor	Fairness (Unfair)			Morality (Wrong)		
		B	SE	Sig	B	SE	Sig
1.1	authority(Adult)	-1.32	0.34	***	-1.18	0.33	***
1.2	authority(Teacher)	-1.31	0.34	***	-1.32	0.34	***
2.0	treatment(Dis)	-1.41	0.31	***	-1.24	0.30	***
2.1	treatment(Dis)*authority(Adult)	2.68	0.44	***	1.97	0.42	***
2.2	treatment(Dis)*authority(Teacher)	2.73	0.44	***	2.09	0.42	***
3.0	country(CN)	-0.74	0.29	**	-0.64	0.30	**
3.1	country(CN)*authority(Adult)	1.35	0.42	***	1.03	0.41	**
3.2	country(CN)*authority(Teacher)	1.18	0.42	***	1.12	0.42	***
4.0	age_group(Older)	0.54	0.21	***	0.28	0.21	
4.1	*age_group(Older)*authority(Adult)*	*0.01*	*0.3*		*0.37*	*0.29*	
4.2	*age_group(Older)*authority(Teacher)*	*0.18*	*0.3*		*0.22*	*0.29*	
5.0	treatment(Dis)*country(CN)	1.41	0.42	***	1.12	0.41	***
6.1	treatment(Dis)*country(CN)*authority(Adult)	-2.68	0.6	***	-1.98	0.59	***
6.2	treatment(Dis)*country(CN)*authority(Teacher)	-2.82	0.6	***	-1.93	0.58	***

Notes. Numbers flagged by asterisks indicate significant effects and interactions. The level in the brackets is compared with the baseline of each variable: authority(<u>Un-familiar Adult</u>), treatment(<u>Advantageous</u>), country(<u>UK</u>), age_group(<u>Younger</u>) and Fairness/Morality Judgement(<u>Fair/Right</u>).

* $p < .05$; ** $p < .01$; *** $p < .001$

Table 3 summarises the results of the Fairness and Morality Judgement Models. The line numbers group together related effects. For example, in lines 1.1 and 1.2, compared to those who given the treat by a puppet (as the baseline), children were significantly more likely to make *Fair* or *Right* judgements compared to *Unfair* or *Wrong* with a shopkeeper (as an unfamiliar adult) or a teacher. This is indicated by the fact that both values were negative. Effect 2.0 shows that receiving less leads to more *Fair* or *Right* answers. However, when the distributor giving them fewer was an adult (Effect 2.1) or a teacher (Effect 2.2), participants were more likely to report *Unfair* or *Wrong* judgements. The effects of country (3.0) show that Chinese children were significantly more likely to make *Fair or Right* judgements. However, this pattern changes again when they were disadvantaged, in which they made more *Unfair or Wrong* judgements toward an adult (3.1) or a teacher (3.2).

Older children were also more likely to judge the allocations as *Unfair* but not necessarily *Wrong* (4.0). However, age was not mediated by either interaction concerning the authority status of the distributor (adult (4.1) or teacher (4.2)).

More *Unfair or Wrong* judgements were found in Chinese children when they received less (Effect 5.0). However, this pattern changed: Chinese children were more likely to see this as *Fair* or *Right* when the distributor was an adult or a teacher (Effects 6.1 and 6.2).

4.4.3 Justification Models (Fairness and Morality)

Figure 4 presents the distribution of the types of justification made following the fairness (white bars) and morality (black bars) questions. It shows that desires were referred to most (either the distributor's or one of the recipient's), with norms almost as frequently being mentioned. Statements about the authority of the distributor or their generosity to one or both recipients were also mentioned. The low number of uncodable responses suggests that

the children understood why they were being asked to explain their judgement and that the coding scheme was sufficiently inclusive.

Figure 4

Fairness and Morality Justification Distribution
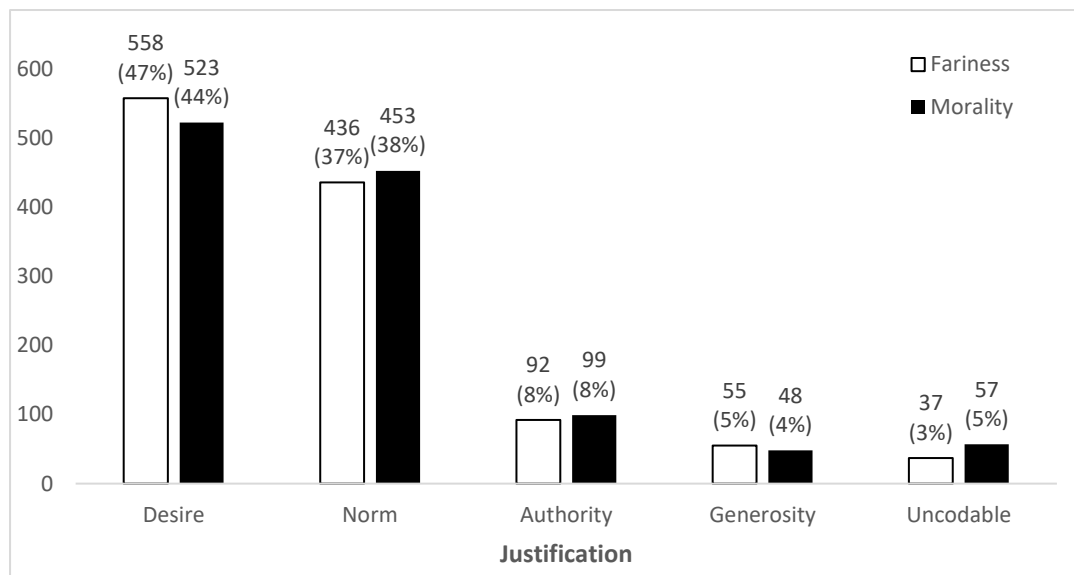
A further two models were performed to analyse children's justifications of their fairness and morality judgements. A multinomial logistic regression approach was employed as there were five types of justifications. Given its centrality to the aims of the study, reference to *Authority* was used as the baseline of these two dependent variables. Building upon the two judgement questions, the exact effects and interactions of the Judgement Model were loaded into the justification models but only those overlapping significant results in Table 3 were considered here. Examining these *Fairness Justification Model* and *Morality Justification Model* separately allowed us to examine the two perspectives individually and the consistency between two. The patterns displayed were almost identical and only influenced by an age effect. Older children were more likely to use authority as a justification of morality compared to desire, norms or uncodable answers, as shown by Effect 4.0 in Section B of Table 4 but not for fairness (Effect 5.0 in Section B). Given the similarity between both justifications (fairness and morality), in the rest of analyses we summarise the

same effects and interactions from two justification models and report them together

(highlighted by the shaded text in Table 4).

Table 4

Summary of Fairness and Morality Justification Models

A	**Fairness Justification**	**Desire**			**Norm**			**Generosity**			**Uncodable**		
	Predictor	B	SE	Sig	B	SE	Sig	B	SE	Sig	B	SE	Sig
1.1	authority(Adult)	-0.64	0.66		-0.81	0.68		-15.39	0.94	***	-2.43	0.92	***
1.2	authority(Teacher)	-0.78	0.64		-1.10	0.67	*	-16.04	1.04	***	-2.73	0.91	***
2.0	treatment(Dis)	0.69	0.70		0.17	0.72		-1.56	1.27		-2.49	1.23	**
2.1	treatment(Dis)*authority(Adult)	-1.06	0.84		-0.39	0.86		16.04	0.86	***	2.59	1.51	*
2.2	treatment(Dis)*authority(Teacher)	-1.26	0.83		-0.53	0.85		14.95	0.89	***	3.30	1.45	**
3.0	country(CN)	1.23	0.86		1.17	0.87		0.53	1.06		-14.08	0.79	***
3.1	country(CN)*authority(Adult)	-0.34	1.04		-0.23	1.05		13.79	0.86	***	-0.43	1.00	
3.2	country(CN)*authority(Teacher)	-0.63	1.01		-0.47	1.02		13.42	0.88	***	**-5.06**	**0.00**	***
4.0	age_group(Older)	-0.20	0.54		0.64	0.55		0.64	0.69		-0.78	0.76	
4.1	*age_group(Older)*authority(Adult)*	*0.11*	*0.66*		*0.22*	*0.67*		*0.65*	*0.91*		*0.01*	*1.16*	
4.2	*age_group(Older)*authority(Teacher)*	*0.39*	*0.65*		*0.49*	*0.66*		*1.65*	*1.09*		*0.62*	*1.03*	
5.0	treatment(Dis)*country(CN)	-1.42	1.13		-1.04	1.15		1.79	1.65		**14.06**	**0.79**	***
6.1	treatment(Dis)*country(CN)*authority(Adult)	1.37	1.37		0.81	1.39		-15.49	1.02	***	-0.33	1.00	
6.2	treatment(Dis)*country(CN)*authority(Teacher)	2.11	1.35		1.51	1.38		-14.32	1.06	***	-11.67	0.00	***
B	**Morality Justification**	**Desire**			**Norm**			**Generosity**			**Uncodable**		
1.1	authority(Adult)	-1.46	0.87	*	-2.23	0.88	**	-15.47	0.68	***	-3.28	1.02	***
1.2	authority(Teacher)	-1.84	0.85	**	-2.66	0.86	***	-18.01	0.95	***	-3.86	1.06	***
2.0	treatment(Dis)	0.26	0.80		-0.54	0.81		-16.37	0.56	***	-2.08	0.99	**
2.1	treatment(Dis)*authority(Adult)	-0.93	0.94		0.32	0.96		30.06	0.68	***	2.56	1.22	**
2.2	treatment(Dis)*authority(Teacher)	-0.64	0.92		0.64	0.94		30.71	0.74	***	3.54	1.25	***
3.0	country(CN)	-0.39	0.77		-0.23	0.77		-0.52	1.02		-20.10	0.53	***
3.1	country(CN)*authority(Adult)	0.36	0.95		0.95	0.95		14.06	0.66	***	19.41	0.77	***
3.2	country(CN)*authority(Teacher)	0.7	0.93		1.47	0.93		14.83	0.75	***	**19.58**	**0.90**	***
4.0	age_group(Older)	-1.64	0.58	***	-1.34	0.58	**	-0.67	0.75		-1.97	0.74	***
4.1	*age_group(Older)*authority(Adult)*	*0.98*	*0.69*		*1.38*	*0.69*	**	*1.13*	*0.97*		*1.37*	*0.94*	
4.2	*age_group(Older)*authority(Teacher)*	*1.07*	*0.68*		*1.31*	*0.68*	*	*2.83*	*1.33*	**	*0.46*	*0.99*	
5.0	treatment(Dis)*country(CN)	-0.75	1.01		-0.16	1.02		16.80	0.73	***	**-5.69**	**0.75**	***
6.1	treatment(Dis)*country(CN)*authority(Adult)	1.17	1.25		-0.03	1.26		-29.65	0.66	***	4.26	0.75	***
6.2	treatment(Dis)*country(CN)*authority(Teacher)	0.93	1.24		-0.37	1.25		-30.28	0.74	***	-16.59	0.00	***

Note. Numbers in italic indicate non-significant interactions from two judgement models and are therefore not discussed. Numbers in grey shade indicate overlapped significant effects from fairness and morality justification model. Numbers in bold indicate differences in these overlapped significances. The level in the brackets is compared with the baseline of each variable: authority(Un-familiar Adult), treatment(Advantageous), setting (Shop), country(UK), age_group(Younger) and Justification(Authority).

As Table 4 shows, children were more likely to justify themselves with reference to

authority than generosity or uncodable response when with a shopkeeper or their teacher.

Even statements about norms were outweighed by those to authority when a teacher made the

allocation (Effect 1.1 and 1.2). When they were disadvantaged, children referred to authority

more often than giving uncodable answers (Effect 2.0). However, generosity is the main reason that children used to justify unequal treatment when the adult or teacher gave them less, with the exception of uncodable utterances (Effect 2.1 and 2.2).

Chinese children were more likely to make justifications based on authority than were British children (Effect 3.0), but when an adult or their teachers made the allocations, they referred more to generosity than authority (Effect 3.1 and 3.2). Chinese children provided more authority reference in relation to fairness but more uncodable answers when considering the morality of allocations by their teacher.

When Chinese children were disadvantaged, they were more likely to provide uncodable answers in relation to fairness but more authority responses in response to questions about morality (Effect 5.0), especially with a teacher (Effect 6.2). Authority was also more dominant as a justification compared to generosity when they were given less by a shopkeeper or a teacher (Effect 6.1).

4.5 Discussion

The results of this study allow us to assess the influence of the authority of a person distributing resources on children's developing fairness judgements and how they justify unequal allocations, especially in terms of cultural variation. They build on the findings of a body of work suggesting developmental trends across the transition to kindergarten/ elementary school and situational influences, and provide strong support for cultural differences. We will discuss these variations in the following order to address our four hypotheses: 1) whether children's acceptance of resource allocation is influenced by the status of the donor; 2) how their views may vary by the proportion of rewards they receive , 3) the cultural and 4) the developmental difference on the effects of authority on their acceptance and justifications of what they acquire relative to another child.

As hypothesis 1 predicted, children judged the generosity and appropriateness of an authority figure's division of treats, based in part on their attributes and social roles: teachers were regarded as the highest authority by children, followed by unknown adults, as shown by the greater acceptance of their resource allocations. This hierarchical power differential is further supported by children's justifications whereby authority-related reasoning was made more with reference to their teachers and unfamiliar adults. These results are consistent with early studies on authority attribution, which identify that authority figures are followed according to their knowledge and social influence (Buzzelli & Johnston, 2001; Laupa, 1994; Laupa & Tse, 2005). Furthermore, our data emphasize the importance of attribute analysis in how we assess the authority of a benefactor and pose questions about the implication of the social domain theory we discussed earlier. Children followed authority at the expense of fairness which is at odds with the theory that children would challenge the legitimacy of authority when their commands conflict with morality. This overwhelming influence of authority was also found in an early study in which authority acted as a double-edged sword. After witnessing an adult model giving half of their rewards to a poor child, 7-year-olds imitated this authority figure's behaviours and behaved generously at their own cost, even without the adult model watching or anyone checking if they had shared. However, when the model performed aggressive actions with various toys, children appeared to follow their authority to do so (Grusec, 1972). It appears by being channelled into altruism or aggression , suggests that children may follow authority blindly.

This dominance of authority effect on children's decision-making is further supported by the high acceptance displayed on DI trails (hypothesis two), particularly in the Chinese sample (hypothesis three). Children as young as four should have developed a disadvantageous inequity aversion in which they will reject receiving less in an allocation (McAuliffe et al., 2017). Our results shed a new light on this development by contextualising

it in authority allocation. Schein (2020) has proposed that research questions on morality should be contextualized to truly reflect its implication in reality. Given that two of the three distributors were adults, of which one was their teacher, the 5-year-olds in our study disregarded their DI aversion and followed authority closely can be seen in their justifications.

As expected, Chinese children's performance echoes previous research indicating that they respect an adult's actions more than do their peers from an individualist society. Protesting to an authority figure is not a common practice in their social life. Maintaining harmony and avoiding conflict in the community are prioritized. Even very young children adhere to the idea that authority should be followed in the community and they strictly follow this rule. These are precisely the features of a collectivistic culture (Markus & Kitayama, 1991). This adherence to a rigid hierarchy has been well documented in many previous studies in which respecting and following teachers could not be stressed more often in the Chinese educational system (Breiner, 1980; Chen & Su, 2001; Zhou, Chen & Zhang, 2013). Chinese teachers reportedly prefer a teacher-centred or top-down teaching style compared with Western teachers' endorsement of the opposite style that respects children's autonomy (Wang et al., 2001; Wu, 2001). The pressure to comply with authority is also stressed by the family, the other major influence on socialisation. The Chinese parenting style has focused on the traditional confusion concept of filial piety (Pye, 1992), in which obedience to authority figures, such as parents and the elderly, is highly emphasized (Dien, 1982; Helwig, et al., 2003). Chinese people are often reported to tend to adjust their behaviours according to the requirements of the social context (Ma et al., 2011). The strong influence of authority nurtures Chinese children to consider authority centrally in decision making.

However, both the treatment and cultural effects, in relation to hypothesis 2 and 3 respectively, should be interpreted with caution as we look into their interaction with

authority. Children reported fewer agreements with either adult when they received less from them but cited generosity to justify these DI. Their responses should not be simply taken as an expression of blind obedience in the early development of fairness understanding. Social norms are deeply embedded in national curricula and teachers are obligated to foster good behaviours in children through all their interactions with others (Power & Higgins-D'Alessandro, 2008; Wentzel, 2015). While authority figures may be key agents, displaying and enforcing social norms, children need to learn to refer to higher moral principles to justify others' behaviours. Reference to the donor's generosity is one way to account for an unfair allocation. Children frame their justifications within the highly prosocial tendency to adhere to social norms even when others had broken the rules.

Nevertheless, Chinese children's higher acceptance of adults' actions also does not necessarily imply a simple acceptance of authority. They did protest about these unfair allocations with both adults. Given that an odd number of items was presented in all divisions, equality was naturally not an option. Our Chinese group, in particular, may have used the unfair nature of event to test the balance between filial duty and the social norm of equal shares. They appeared to be attempting to reconcile this contradiction by acknowledging that an adult had the right to be generous to one child or another. They stated, for example, 'It's not the same (the number of items given to each party) but that's fine.' when realising that it was not realistic to split three strawberries evenly.

Such a nuanced response implies that generosity is one of the moral principles that are to be fostered in children, especially in China, may be under the shadow of authority. That the treatment * authority interaction was qualified by culture, suggests that Chinese children were more likely to accept DI, referring to authority to justify unequal allocations. As we discussed earlier, behaviour management is emphasised in Chinese schools (see Chapter 3 for a discussion on discipline) and such tight adherence to results in a rigid respect and

compliance for authority (Gao, 1998). Hence, a possible explanation for this and the very consistency of Chinese children's responses across trials is that they may have taken this experiment as a test of the stability of their conduct. In Chinese schools, 40% Chinese children chose to share generously with a stranger (Li et al., 2019). It is likely that when children received fewer resources from their teacher, they may perceive this as a test for their generosity and felt obligated to act accordingly. The British children were far more likely to be influenced by the particular demands of a trial.

Addressing the fourth hypothesis, we also found a developmental shift in how children evaluate authority across moral domains. The older children seemed to be upholding fairness closely but did not report the wrongness of these unequal divisions. These inconsistencies in older children's judgements are also reflected in their justifications. Their fairness justifications showed little association with references to authority, which were nevertheless predominant in morality justifications. We found that older children considered various factors concerning whether it was 'right' to make an unequal distribution, but only authority in general in their morality judgements.

This developmental shift, namely older children's indistinctive responses in their fairness and morality judgements and justifications, might be associated with the development of higher cognitive functions. According to the social information processing model, how children process social cues is highly influential on their decision making (Crick & Dodge, 1994; Arsenio & Lemerise, 2004). While preschoolers normally only grasp information concerning one aspect of the situation, children older than 5 become capable of integrating information from more than two dimensions (Case et al., 1996, Miller & Aloise, 1989; Lucas, et al., 2013). This developmental difference is also reflected in the moral domain. One study assessing children's moral emotion reasoning found that 4-year-old children seemed to value desire as a reference for the attribution of emotion, but 5-year-olds

related desires to moral transgressions and their consequences (Zhou, Chen & Zhang, 2013). Therefore, when judging an unfair distribution of treats, young children are very likely to focus on guaranteed resources in order to satisfy their own desires. They consider even these unfair treatments to reflect a correct decision. Conversely, older children can fully examine the situation to analyse its different aspects. This more sophisticated approach results in more complex responses in older children as they carefully balance all presenting factors which will eventually lead to choices that respect social norms over some gain.

In general, children's justifications align with these effects closely. This relies upon drawing from multiple resources of information in decision making and weighting moral dimensions against one another. Furthermore, these responses also reflect the great consistency of children's understanding of fairness and morality. Fairness is generally considered as a salient element of morality and manifests itself in social behavioural norms. For example, young children normally substitute fairness with equality and develop a strong inequity aversion (Shaw & Olson, 2012). This could lead to the impression that children's acquisition of fairness is a reinforcement of behavioural norms rather than a thorough understanding of its moral foundations. Results from previous social imitation studies provide further evidence for such an argument (Carpenter, Akhtar, & Tomasello, 1998; Gergely & Csibra, 2006; Meltzoff & Moore, 1995). However, the robust corroboration among children's fairness and morality justifications found in this study, particularly their balancing of correctness over personal gain, suggests that children's experience of fairness behaviours contributes to a formation of more complex moral principles.

We did not receive permission to record the interactions so the lack of transcripts of such information and nonverbal behaviour pose limitations to the current study. It was designed to only focus on unfair treatment to provide challenging or conflicting scenarios between the children and others, particularly their teacher, and also, we did not want to

increase the number of trials repeated in the test, this design of the allocations which were only presented in unfair ways, may cause the lack of a fair allocation as a baseline. Although it came out to be a valid choice to use a stereotypical classroom as a means of representing their teacher at the time of testing, to ensure the consistency of all authority figures presented, the absence of a real teacher in the test may undermine the authority effect we expected to be even higher. Indeed, the strong effect of authority found in this study, especially among Chinese children, impresses us that a test outside of school settings maybe considered to allow children to act freely to the tasks. Further empirical analyses should address these concerns and allow future researchers to examine in more detail the contextual influences on children's fairness reasoning, including what appear to be marked differences in the cultural processes which channel this thinking.

Although the general trajectory of children's grasp of fairness appears to be universal and develop alongside their growing social experience and learned norms, this development may not unfold in a uniform way across societies. The cultural variations identified in this study, particularly the consistency in Chinese children's responses and flexibility in the British sample, shed new light on children's moral development. Furthermore, we also highlight the methodological advance of using assessments of children's justifications, like those we solicited here. These allow us to provide greater insight of children's reasoning about fairness and its moral implication.

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4.7 Appendix 1

Test Stimuli

Treatments were counterbalanced and presented randomly for authority and settings. Half of the children received advantageous allocations from a baker and the other half were advantaged by a shop assistant. Similarly, Half of the children received advantageous allocations from a puppet in their school and the other half in a shop.

Scenario 1: School- Teacher

It is fruit time in your class and there are 3 mini bananas left in the tray. The tray will be taken away very soon by the kitchen staff, so your teacher decides to give you 2 mini bananas and give another girl 1.

Scenario 2: School- Teacher

It is a really hot day in the summer, so your teacher decides to give the class ice-creams to help the children feel chill. There are three mine ice creams left and they will melt soon. The teacher decides to give you 1 ice-cream and give 2 to another girl in your class.

Scenario 3: Shop- Unfamiliar adult

This is a Bakery opened recently near to your home. The baker in the shop is giving away free cupcakes. She has 3 left. The baker gives you 2 cupcakes and gives another boy [girl] who came into the shop the other one.

Scenario 4: Shop- Unfamiliar adult

You go to this supermarket one day and you meet a Shop Assistant who is giving children free strawberries. There are three strawberries in her tray. The shop assistant gives you 2 strawberries and give the other one to the next child she meets.

Scenario 5: School- Puppet

Today in school, your teacher has asked this puppet girl to be in charge of the snack time. The puppet girl has three mini cookies. Puppet girl decides to give you one cookie but give two cookies to someone else in you class.

Scenario 6: Shop- Puppet

In a fruit shop, the owner of the shop needs to leave and asks puppet boy to give children three mini apples. Puppet boy decides to give you 2 mini apples and give another boy 1 apple.

After each story, children were asked all the following questions:

Fairness judgement question:

*Is it fair or unfair that the [authority figure] gave you [N*item(s)] and gave the other child [N*item]?*

Fairness justification question:

Why do you think it is (not) fair?

Morality judgement question:

*Is it right or wrong for the [authority figure] to give you [N*item(s)] and gave the other child [N*item]?*

Morality justification question:

Why do you think it is right (wrong)?

Chapter 5: Social Understanding in a Fairness Game

Become a Dictator in Fairness Game: How Social Understanding Affects Young Children's Fairness Allocations with Different Recipients?

Research Highlights

- The evidence on the relation between children's social understanding and fairness behaviours is unclear.

- Fair, advantageous and disadvantageous allocations were presented to 124 Chinese and British preschoolers and their friends, a sibling or a stranger peer.

- Multiple aspects of 'theory of mind' ability were assessed in relation to fairness judgements and emotions to provide an informative picture of children's development.

- A higher theory of mind score predicts a better fairness understanding but it does not act as a sole facilitator.

Keywords

Social Understanding; Theory of Mind; Fairness Development; Moral Emotion; Resource Allocation; Cultural Comparisons

5.1 Abstract

Despite the large literature investigating the early development of children's fairness understanding, we know little about the transitions that take place in the preschool period which set the foundation for children to form general fairness norms. We explored this mystery in relation to another ability that is often considered to develop rapidly at the same age – social understanding. Although a positive association between the two has been reported, common agreement has not yet been reached. We analysed 124 British and Chinese preschoolers' acceptances of, and emotion responses to, three allocations (fair, advantageous to the child or disadvantageous) that they shared with a named friend, a sibling or a stranger child. A series of generalized linear mixed model suggested that British and older children and children with better social understandings were more likely to reject allocations regardless the gain or loss involved. Follow-up emotion probes suggested that older children reported greater sadness in rejecting an offer. 'Theory of mind' helped preschoolers to balance their self-interest with normativism but they applied more complex evaluations, showing an influence of their relationship with the recipients in making informed decisions regarding fairness allocations.

5.2 Introduction

As early as 15 months of age, infants show signs of fairness sensitivity (Schmidt & Sommerville, 2011). Sixteen-month-olds can evaluate an agent's distributive actions and look longer at a fair allocation (Geraci & Surian, 2011). By 19 months, infants start to expect resources to be divided equally (Sloane, Baillargeon & Premack, 2012). After this emergence of fairness awareness in infancy, the trajectory of understanding has been mainly focused from 3 years old and onwards. From two- to three years, children can slowly overcome their own desires for the resources and engage in equal sharing (Shaw et al., 2014; Smith, Blake & Harris, 2013). However, 3- to 4-year-old children experience difficulties in sharing resources equally, despite their earlier abilities (Hamann, et al., 2011; Smith, Blake, & Harris, 2013). Only five-year-olds start to show a tendency to make or sanction fair divisions (Rochat et al., 2009). The development of fairness principles is not fully established until the age of 8, when children gradually form an adult-like fairness system (Blake & McAuliffe, 2011; Benenson, Pascoe & Radmore, 2007; Harbaugh, Krause & Liday, 2003). However, this developmental account leaves an obvious gap between the infancy and early childhood, especially the third year of life, in terms of how children grow out of egocentrism and 'prefer' egalitarianism increasingly in resource allocations? We present a study of children including those who are slightly younger than age three to examine this gap with the aim of illuminating what could be termed the dark age of young children's fairness development.

Early childhood is also the crucial stage for another ability that develops in parallel with fairness, which is social understanding, often termed 'Theory of Mind' (ToM). This was initially regarded simply as the ability to read another's beliefs (Premack & Woodruff, 1978), but subsequently incorporated a range of mental states including desires, intentions, and emotions (Wellman, 1991). The development of social understanding has been reported as a sequential process of gaining ability to understand different aspects of the mind (Wellman &

Liu, 2004). This ability develops rapidly over preschool years (Wellman, Cross, & Watson, 2001; Liu, Wellman, Tardif & Sabbagh, 2008). For example, 2-year-olds start to understand desires and by age 3, they have learned true beliefs (Bartsch and Wellman 1995; Wellman 1991; Wellman and Bartsch 1994). Prior to age 4, children's understanding of mental states is limited to non-epistemic concepts. After this age, they grasp meta-representation (Perner, 1991), so that more complex mental states such as emotions, become accessible to them (Bartsch & Wellman, 1995). In light of children's changing attitude on fairness behaviours that we discussed earlier, the understanding that shifts from desires to emotions, across the preschool years, may somewhere overlap with children's fairness development or even derive from the same mechanism.

Social understanding has been reported as one of the core social cognitive foundations for individuals to understand and adapt to the social world, especially in terms of grasping social norms and prosocial behaviours (Gummerum, Hanoch, & Keller, 2008; Wellman, Cross & Watson, 2001). To align their own behaviours with social norms, a person does not only need to understand what the rules are but also how their behaviours would be perceived by others in relation to those rules (Fehr & Fischbacher, 2004; Singer & Steinbeis, 2009). An early development of social understanding is vital for the integration of both understandings (Gummerum et al., 2008). By mentally representing others' expectations and the emotional consequences of their behaviours, preschoolers adjust their actions accordingly. Children even change their decisions between fair and unfair allocations swiftly based on descriptions that involving different degrees of a recipient's characteristics (Malti et al., 2016). A better mental representation of the recipient results in fairer allocations (Yan-jie, 2011). Therefore, the development of social understanding may consequently prompt an awareness of others' welfare, and should spur a greater fairness in young children (Caputi et al., 2012; Farrant et al., 2012).

Taking a recipient's perspective is not the only facilitator that is introduced by social understanding in fairness challenges. Children with a better grasp of mental states appear also to have a stronger concern of their social reputation. Hence, acting fairly in a way that follows both social norms and the recipient's expectations is an important strategy for maintaining good reputations (Engelmann & Rapp, 2018; Shaw et al., 2014). In addition, a growing empathy complemented by an understanding of beliefs may also increase children's awareness of the emotional burdens imposed on individuals in receipt of unfair distributions. For example, knowing their allocation would lead to the recipient's bad feeling, moral emotions such as guilt may prevent children from selfish behaviours (Paulus & Moore, 2015). A positive relation between fairness and social understanding has been reported in several studies (Castelli et al., 2010; Castelli et al., 2014; Rochat et al., 2009; Takagishi et al., 2010; Wu & Su, 2014). However, how a 'theory of mind' influences children's emerging grasp of fairness is far from being commonly agreed upon.

Some studies do not find an association between fairness and social understanding (Lucas, Wagner & Chow, 2008; Mulvey, Buchheister & McGrath, 2016; Takagishi et al.,2010). In one such study, 4.5 year old children who passed the classic unexpected contents (false belief) task and were capable of reasoning strategically, did not conduct fairness behaviours more easily (Lucas ,Wagner & Chow, 2008). Moreover, autistic children who are more likely to fail false belief, demonstrate a competence in fairness games (Hill & Sally, 2006). It has even been claimed that false belief understanding may provide an obstacle for achieving fairness. Three- and 5-year-olds who passed ToM tasks shared less in a Dictator Game, in which the child has to decide how they would they prefer to split rewards with another [usually hypothetical] (Cowell et al., 2015). Having the active role as a dictator, those children may have realised that the other party cannot stop them from being selfish. Hence, they may take advantage of the game rules and allocated more to themselves.

The above studies show a contrasting links between social and fairness. This contrast might be resolved if a wider range of tasks were employed. The majority of studies used false belief tasks (e.g. the unexpected contents task or change location task) alone. This may not be sufficient to fully capture their social understanding or be relevant enough to measure fairness considerations. As stated above 'theory of mind' is a set of multi-faceted skills. In addition to beliefs, the ability to gather, feature and justify desires and emotions is also part of the process (Flavell, 2004; Frith & Frith, 1999). We considered that especially the last two dimensions should be included in testing, as fairness involves a dual consideration of cognition and emotion (Beugré, 2009). Another limitation of the above studies is that only relations between fairness and ToM were identified, as we see, for example, in Castelli et al.'s (2010) and Wu and Su's studies (2014). There is thus a need to look more broadly at the construct of 'theory of mind' in relation to fairness.

Therefore, in this study, we planned to investigate the predictive effect of social understanding on fairness by using a variety of 'theory of mind' tasks that assess different aspects of the ability. Based on the theoretical analyses of Shaw (2014) and Paulus (2015), we mainly hypothesized that better social understanding abilities would predict better fairness understanding. Furthermore, several studies have reported a clear influence of different recipients on fairness. For example, children show favouritism to a friend or an in-group member and allocate more to these recipients (Fehr, Bernhard & Rockenbach, 2008; Moore, 2009; Paulus & Moore, 2014). Hence, we included relation as a factor in order to capture a range of attributions applied by the child. Cross-cultural variation was also taken into account for two reasons: 1) the development of social understanding varies across cultures and 2) Western children are reported to be more advanced in social understanding development than their peers in the east (Shahaeian et al., 2011). Investigating children from China and the UK at different stages of 'theory of mind' would allow us to explore these subtle differences. This

is timely as children from different cultural backgrounds also react differently to fairness allocations. Rochat's (2009) study shows wide differences across seven countries. Individualistic culture leads to less equality, but collectivistic society shapes strict norms of fairness (Henrich et al., 2005; Oosterbeek et al., 2004). Thus, collecting data from both British and Chinese children allows us to test this east-west variation and boost the generalization of our conclusion concerning social understanding.

5.3 Method

5.3.1 Participants

We tested 124 typically developing children (71 males) recruited from local preschoolers in both China and the UK serving low- to middle-income families. Their ages ranged from 33 - 56 months, $M = 42$ months, $SD = 5.36$ months. Our plan was to recruit approximately 100 children from each country. We followed the plan closely in China and tested 99 Chinese children. However, the recruitment in the UK had to be aborted due to the Covid-19 outbreak and only 38 British children were tested before school closures in England. Seven Chinese and 6 British children were excluded from the final sample as they did not complete all the tasks. The study was approved by the Faculty of Science and Technology's Ethics Committee at Lancaster University. Consent was obtained from parents and teachers. Children's own willingness was also respected prior to testing.

5.3.2 Materials and Procedure

Each child was tested by the first author at a table in a quiet corner of the class. They faced an iPad which displayed the task. The experimental stimuli were programmed using the online software, Qualtrics. They included coloured pictures that were compiled so that the social understanding and allocation tasks could be administered in the same medium in both cultures.

Social Understanding: We included four tasks that were derived from The Theory of Mind Scale (TMS) (Wellman & Liu, 2004). Apart from Diverse Desires (DD), each of the other three tasks involved both a memory question, which checks if the child remembered the task correctly, and a test question, which represented each component part. Based on their performance in the tasks (pass or fail), children were scored of 1 (for pass) or 0 (for fail) on the DD task. For the Knowledge Access (KA), Explicit False Belief (EFB) and Hidden Emotion (HE) task, if they failed the test question, their score would be 0 regardless of their accuracy on the memory question. If they passed the test question, their score would be 1 and an additional 1 score was obtained if they also passed the memory question (Wellman et al., 2006). All scores were added together as their overall ToM score with the maximum value of 7.

Table 1

Brief Description of Tasks used in Wellman & Liu's Theory of Mind Scale

Task	Description
Diverse Desires (DD)	Child judges that two persons (the child vs. someone else) have different desires about the same objects.
Knowledge Access (KA)	Child sees what is in a box and judges the knowledge (yes–no) of another person who does not see what is in a box.
Explicit False Belief (EFB)	Child judges how someone will search, given that person's mistaken belief.
Hidden Emotion (HE)	Child judges how a person will feel, given a belief that is mistaken.

Note. These tasks were administered by the order which they were presented in the table. The task descriptions are quoted from Wellman and Liu's (2004) original paper.

Fairness Acceptance and Emotion: In the fairness task, we employed one version of the Inequity Game (Blake & McAuliffe, 2011) by having the researcher act as the proposer who decided the distributions in order to reduce the cognitive demand on children having to make the allocations themselves. In a fair allocation trial, two candies were presented and the

researcher allocated one candy to each party: the child and a recipient. In Advantageous Inequality (AI) trials, participants were rewarded with two candies and the recipient only received one. The allocation was reversed in Disadvantageous Inequality (DI) trials. Each allocation trial was repeated three times, each with different recipient: a sibling (or a hypothetical sibling for a singleton), a friend (named by the child) and a stranger (a child of the same gender and age as the child who was described as being from another town and who the child did not know). After each allocation, the child was asked to decide whether they wanted to reject or accept the allocation. If they rejected, both parties would receive nothing. Following the judgement, the child's emotional reaction to the allocation was also recored by adapting the Sad–neutral–happy Facial Expression Scale by Wellman et al. (2004). Five faces expressing five different emotions, very happy, happy, neutral, sad and very sad, were presented and they were scored from 1 to 5 on a five-point Likert scale.

5.4 Results

5.4.1 Acceptance Distributions

In the assessment of children's mental state understanding, all children passed the Diverse Desires task successfully and the pass rates for Knowledge Access, False Belief and Hidden Emotion were, respectively, 38.7%, 55.6% and 49.2%. As our focus was on the broad relationship between the 'Theory of Mind' scale in general, we constructed a score by averaging performance across all these tasks (Wellman & Liu, 2004). The mean was 3.33 out of 7, SD = 1.53. As for the fairness assessment, children's judgements were detailed in Figure 1 and 2 with the proportion of each type in each country and age group respectively.

Figure 1

Judgement Distributions %(N) by Allocation in Each Country
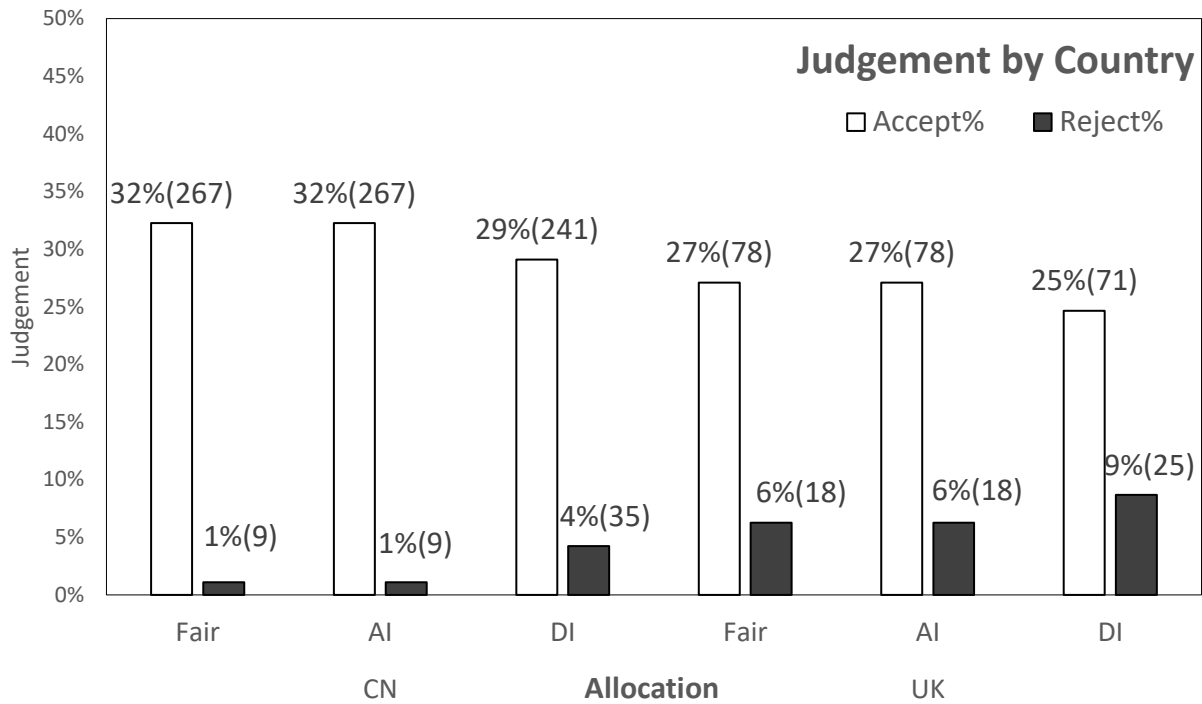
Note. The three types of allocation are displayed on the x-axis including fair, unfair but advantageous to the participant (AI) and unfair but disadvantageous to the participant (DI). The number of each bar represents the count of each judgement made, with its proportion (%) of the judgements made in each country.

Figure 2

Judgement Distributions %(N) by Allocation in Each Age Group
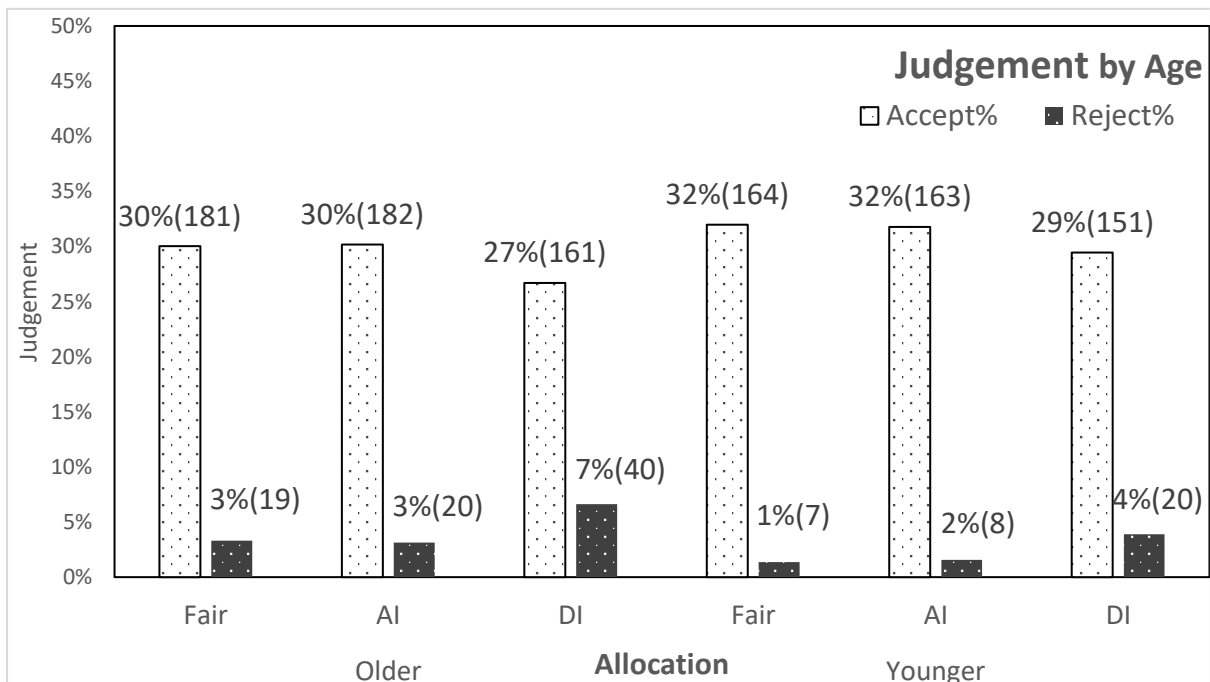
Note. The three types of allocation are displayed on the x-axis including fair, unfair but advantageous to the participant and unfair but disadvantageous to the participant. The number of each bar represents the count of each judgement made, with its proportion (%) of the judgements made in each age group.

5.4.2 Modelling

We explored the effects of gender to examine if this should be included in subsequent models. Neither the main effect nor any interactions involving gender were significant so we do not examine this factor further. Furthermore, siblinghood was also explored in preliminary analyses to test whether having a real sibling or a hypothetical one made a difference on children's fairness understandings. Results from four regression models showed that regardless of age or country, children's fairness judgement and emotion were not affected by their siblinghood cross trials with different allocations. Therefore, relationship was used in the following analyses to examine the difference among a sibling, a friend and a stranger recipient. To test the specific hypotheses outlined in the Introduction, we conducted a series of repeated measures linear mixed effect analyses on the children's judgements of fairness and emotion using the 'lme4' package in R (Bates D et al., 2015). We treated subjects as a random effect and examined country, age and ToM as between participants factor in each model respectively and allocation and relation as within participants variables 3 (allocations[fair/AI/DI]) * 3 (relations[sibling/friend/ stranger]). Given that the UK sample was relatively small we examined the three between participant factors separately before conducting a tentative analysis with all three included. The model structures and significant results were summarised in Table 2.

Table 2

Model Equation Summary

Key IV(s)	DV	Equation
Country	Judgement	*judgement~**country***allocation*relation*
	Emotion	*emotion~**country***allocation*acceptance*relation*
Age	Judgement	*judgement~**age***allocation*relation*
	Emotion	*emotion~**age***allocation*acceptance*relation*
ToM	Judgement	*judgement~**ToM***allocation*relation*
	Emotion	*emotion~**ToM***allocation*acceptance*relation*
Country+Age+ToM	Judgement	*judgement~ **country***allocation*relation+ **age***allocation*relation +**ToM***allocation*relation*
	Emotion	*emotion~ **country***allocation*acceptance*relation+ **age***allocation*acceptance*relation+ **ToM***allocation*acceptance*relation*

Note. In this R syntax, the variable on the left of the tilde (~) is the dependent variable and those on the right are predictors. The plus operator (+) simply adds main effects to the model. The asterisk operator (*) requests the main effect of each attached variable and the interactions among them. The JM contains both children's judgements of fairness and morality.

In each model the baseline for the dependent variable was *accepting* the offer, while those for the independent variables were the *fair* allocation, *China* and the *stranger* child. To the left of the equivalence sign (~) is the dependent variable while the asterixis to the right indicate main effects and interactions. Table 3 shows the results of these analyses with each panel displaying the significant effects and interactions of each model. It reports the model for culture in full but summarises only the effects of adding age and ToM, given that the two samples were different in terms of their sizes.

Table 3

Model Description and Significant Results Summary

Re.	IV*Interaction	DV	Effect	β	SE	Sig
1.1.1	**Culture**	Judgement	country(UK)	2.48	0.94	**
1.1.2			allocation(UFdis)*relation(Friend)	3.73	1.34	**
1.1.3			allocation(UFdis)*relation(Sibling)	2.39	1.13	*
1.1.4			country(UK)*allocation(UFdis)*relation(Friend)	-3.55	1.69	*
1.2.1		Emotion	allocation(UFad)	0.99	0.18	***
1.2.2			judgement(Reject)	2.55	0.53	***
1.2.3			country(UK)*judgement(Reject)	-2.66	0.75	***
1.2.4			allocation(UFdis)*judgement(Reject)	-2.35	0.70	***
1.2.5			judgement(Reject)*relation(Friend)	-2.86	1.36	*
1.2.6			judgement(Reject)*relation(Sibling)	-4.47	1.04	***
1.2.7			country(UK)*allocation(UFdis)*judgement(Reject)	2.86	0.99	**
1.2.8			country(UK)*judgement(Reject)*relation(Friend)	4.67	1.61	**
1.2.9			country(UK)*judgement(Reject)*relation(Sibling)	4.59	1.29	***
1.2.10			allocation(UFad)*judgement(Reject)*relation(Sibling)	4.77	1.52	**
1.2.11			allocation(UFdis)*judgement(Reject)*relation(Sibling)	4.63	1.19	***
1.2.12			country(UK)*allocation(UFdis)*judgement(Reject)*relation(Friend)	-4.91	1.84	**
1.2.13			country(UK)*allocation(UFad)*judgement(Reject)*relation(Sibling)	-5.02	1.87	**
1.2.14			country(UK)*allocation(UFdis)*judgement(Reject)*relation(Sibling)	-5.07	1.57	**
2.1.1	**Age**	Judgement	age	0.15	0.08	*
2.2.1		Emotion	age	0.07	0.03	**
2.2.2			judgement(Reject)	7.41	2.54	**
2.2.3			age*judgement(Reject)	-0.14	0.06	*
2.2.4			allocation(UFdis)*judgement(Reject)	-7.58	3.35	*
2.2.5			judgement(Reject)*relation(Friend)	-10.14	5.03	*
2.2.6			age*allocation(UFdis)*judgement(Reject)	0.15	0.07	*
2.2.7			age*allocation(UFdis)*relation(Friend)	0.09	0.05	*
2.2.8			age*judgement(Reject)*relation(Friend)	0.23	0.11	*
2.2.9			allocation(UFdis)*judgement(Reject)*relation(Friend)	11.87	5.84	*
2.2.10			age*allocation(UFdis)*judgement(Reject)*relation(Friend)	-0.29	0.13	*
3.1.1	**ToM**	Judgement	ToM	0.82	0.31	**
3.2.1		Emotion	allocation(UFad)	0.94	0.37	*
3.2.2			allocation(UFdis)*judgement(Reject)	-4.77	1.78	**
3.2.3			ToM*allocation(UFdis)*judgement(Reject)	0.94	0.41	*
3.2.4			ToM*allocation(UFdis)*judgement(Reject)*relation(Friend)	-1.29	0.60	*
4.1.1	**Culture+ Age+ Tom**	Judgement	*ToM*	*0.68*	*0.31*	*
4.1.2			*country(UK)*allocation(UFdis)*relation(Friend)*	*-5.16*	*2.15*	*
4.1.3			country(UK)*allocation(UFdis)*relation(Sibling)	-4.10	1.90	*
4.2.1		Emotion	*judgement(Reject)*	*6.28*	*3.07*	*
4.2.2			*age*	*0.07*	*0.03*	*
4.2.3			country(UK):allocation(UFad)	-0.90	0.44	*
4.2.4			*country(UK):judgement(Reject)*	*-3.35*	*0.99*	***
4.2.5			*allocation(UFdis):judgement(Reject)*	*-11.35*	*4.07*	**
4.2.6			*country(UK):allocation(UFdis):judgement(Reject)*	*3.16*	*1.26*	*
4.2.7			*country(UK):relation(Friend):judgement(Reject)*	*5.11*	*2.51*	*
4.2.8			*country(UK):relation(Sibling):judgement(Reject)*	*5.67*	*1.48*	***
4.2.9			*allocation(UFdis):relation(Friend):judgement(Reject)*	*14.84*	*7.32*	*

4.2.10	*allocation(UFdis):judgement(Reject):ToM*	*1.62*	*0.44*	*****
4.2.11	*country(UK):allocation(UFad):relation(Sibling):judgement(Reject)*	*-5.03*	*2.35*	***
4.2.12	*country(UK):allocation(UFdis):relation(Sibling):judgement(Reject)*	*-4.81*	*1.91*	***
4.2.13	*allocation(UFdis):relation(Friend):judgement(Reject):ToM*	*-1.57*	*0.69*	***
4.2.14	allocation(UFdis):relation(Sibling):judgement(Reject):ToM	-1.65	0.61	**

Note. In models that used the Judgement as the DV, each IV was explored as interactions with allocation*relation. For the Emotion models, each IV interacted with allocation*relation*judgement. Text in grey shade indicates overlapping effects and interactions with the Cultural Model and which will not be reported further as a result. Text in italics indicates results that are identical to the effects from the other three models.

Table 3, panel 1, examines the effect of culture. In comparison to their Chinese peers, British children were more likely to reject the allocations regardless of their possible rewards (Effect 1.1.1). When children received less than a friend or sibling, they rejected the bid more often than they did with a stranger (Effect 1.1.2 and Effect 1.1.3). However, when British children received a lesser share than their friend, they were willing to accept this DI (Effect 1.1.4). This cultural variation was also reflected in their emotion responses. Regardless of their cultural background, all children who received more were more likely to be sad about the allocation (Effect 1.2.1). They also expressed greater sadness when they rejected an allocation (Effect 1.2.2). However, British children were happier to reject than Chinese children were (Effect 1.2.3). When a greater or shared allocation with a friend/sibling was rejected, children identified happier reactions (Effects 1.2.4, 1.2.5 and 1.2.6), but British children identified more sadness about these three rejections (Effects 1.2.7, 1.2.8 and 1.2.9). When children rejected the allocation made to them and a sibling, no matter who gained, they were more likely to express sadness (Effects 1.2.10 and 1.2.11). However, British children were happier when they rejected an AI or DI with a sibling, and DI with a friend (Effects 1.2.12, 1.2.13 and 1.2.14).

Age was a significant contributor to the model (see Table 2, panel 2). Older children were more likely to reject allocations (Effect 2.1.1), and children generally expressed more sadness in doing so (Effect 2.2.1 and Effect 2.2.2). They reported more happiness in rejecting

an allocation (Effect 2.2.3), but selected a sadder face when they rejected a lesser reward, when sharing resources with a friend or just having been disadvantaged with a friend (Effects 2.2.6, 2.2.7 & 2.2.8). These effects were qualified by a higher order interaction showing that older children reported being happier to reject receiving less than their friend (Effect 2.2.10).

Children who scored higher on Wellman and Liu's 'Theory of Mind' tasks tended to reject the allocations (Effect 3.1.1). Those who scored higher on the ToM tasks expressed more sadness even if they rejected an DI (Effect 3.2.3), but were more positive when they were paired with a friend (Effect 3.2.4). Having identified a significant effect of ToM on children's judgement but not emotion, we expanded our analysis to investigate whether the four sub-scale items contributed to the ToM effect on their judgement. As all children passed the DD task successfully which means no variance was presented, we conducted three logistic regression models to examine the effect of KA, EFB and HE and their interactions with allocation and relation on children's judgements respectively. No significant effects or interactions (not detailed here) of these three sub-scale items, KA ($\beta = .18$, $SE = .50$, $p = .72$), EFB ($\beta = .33$, SE = .51, $p = .52$) and HE ($\beta = -.22$, $SE = .58$, $p = .71$) were found.

Finally, when all the between participant factors were entered into the model only three of the analyses retained their significance. Higher ToM scores continued to relate to a greater likelihood of rejecting the allocations that were made (Effect 4.1.1), even when its covariance with age and culture were taken into account. The only interactions to be retained were those involving cultural effects in response to receiving a lesser amount than their friend or sibling, while British children were more accepting (Effects 4.1.2 and 4.1.3). Most of the emotion responses children displayed were also identical to the other three models apart from Effect 4.2.3 in which British children were happier when they received more and Effect 4.2.14 showing that children with higher ToM scores were also happier when they rejected an allocation where they received less than a sibling.

5.5 Discussion

The study suggests that each of the factors under investigation influenced children's fairness understanding. I will discuss each of the analyses before drawing some general conclusions. I examine, in turn, the developmental issues at this crucial period, the link between social understanding and the child's preparedness to reject an allocation,

5.5.1 Developmental Effect

We set off to explore the underlying mechanism of the early developmental transition in children's fairness behaviours. The results shown that during the age period of 2.5 to 4.5 years, which is less documented in the literature as the focus has always been on older participants, children display a growing tendency to reject allocations regardless of their gain or loss, even when fair allocations were presented in one third of the trials. At a glance, this might be taken as a random behaviour to reject everything among those young children and they are incapable of differentiating the three allocations (fair, AI and DI). However, the overall rejection was only 10%, and of which half were DI trials, where most of the rejections naturally occur (LoBue et al., 2010; Takagishi et al., 2010). This aligns closely with our finding that children expressed more negative emotions about these allocations with age, but they were happier when they rejected a DI. All these indicate that children do distinguish these three allocations and show a concern for fairness at this young age. Although those young children find it difficult to enact fairness, they are still trying to adjust their responses to different allocations. Learning about fairness appears to involve trial and error, in which there is a fine line between their own desires and the social norm of fairness. Self-interest, the force that drives children away from fairness, becomes less influential with age (Yu, Zhu & Leslie, 2016).

In a study that sheltered children from tempting rewards, preschoolers were able to offer more and accept less than others, as did their third/ sixth grade comparators (Murnighan

& Saxon, 1998). In addition, with the decreasing effect of self-interest, many other forces that affect fairness appear to emerge during early preschool years - for example, cooperation and reciprocity (Castelli et al., 2014). With additional contexts like these, children as young as three are able to give away toys out of consideration of merit in a collaboration task (Hamann, Bender & Tomasello, 2014). Such experiences may help young children come to practice fairness as a multi-determined concept and develop a full range of understanding that serves as a foundation for later experiences where they encounter similar allocation tasks. Therefore, it is likely to be the case that there is no sudden transition in children's fairness development. Instead, the different patterns occurring between infancy and early preschool years are a marker of the start of a new period of change, as shown by this underlying mechanism that young children attempt to explore social norms.

5.5.2 ToM Effects

As predicted, our results suggest that social understanding remains as a significant predictor of whether or not children accept an allocation as fair even when the other covariates were taken into account. This supports the research finding a positive relationship between the two constructs (Mulvey, Buchheister, & McGrath, 2016; Rochat et al., 2009; Takagishi, Kameshima, Schug, Koizumi, & Yamagishi, 2010; Wu & Su, 2014). Children with better ToM scores were more likely to reject all three types of allocations. This result partially replicates Castelli and colleagues' (2010) work. They found that children who grasped first older false belief were more likely to reject unfair allocations. They tested an older sample to the one used here (5–10 year olds) at a stage when a failure to pass first order tasks is most unlikely (Miller, 2009). The group studied here was much more age-appropriate for this task, as was the measure of fairness understanding. We can conclude that social understanding, even when chronological age is taken into account, can serve as a facilitator of the ability to reject an allocation at this stage.

However, this does not necessarily suggest that social understanding is pre-requisite for the development of fairness. It has been reported to relate to a better perspective taking ability (Caputi, Lecce, Pagnin, & Banerjee, 2012; Farrant et al., 2012), a motivation to maintain good reputations (Buhrmester, Goldfarb, & Cantrell, 1992; Engelmann, Herrmann, & Tomasello, 2012; Leimgruber, Shaw, Santos, & Olson, 2012) and a growing empathy for others' welfare (Paulus & Moore, 2015). Hence, we need to situate this social understanding within the context of related effects which have been identified in research on 2.5 to 4.5 year old children. Better performance on tasks like knowledge access and false belief may simply equip young children with an ability for strategic thinking about the consequences of the three allocations. When receiving a fair division of spoils, AI or DI, children can think beyond the rewards they can take from the allocation and recognise that the nature of the allocation may place them in a certain position: equal, advantageous or disadvantageous compared with the other recipient. This recognition may motivate them to adjust their response accordingly. Furthermore, their developed understanding of emotion also contributes to this evaluation process by enabling children to simulate their feelings about the allocations. This would explain the findings that children with higher ToM scores also expressed greater sadness when they were disadvantaged but happier when they have rejected DI in favour of a friend.

The possible complexities involved in these emotional responses are not purely out of desire for greater rewards, or a motivation for self-interest upheld by younger children (Smith, Blake, & Harris, 2013). These children indeed displayed an aversion to relative disadvantage which can only be achieved by comparing and evaluating the allocations. Many studies, including meta-analyses that compared cross-cultural variation and longitudinal changes, have reported that disadvantageous aversion develops much earlier than advantageous aversion (Moore & Macgillivray, 2004; Rochat et al., 2009; Williams &

Moore, 2016). Thus, by providing a strategic thinking ability that enables young children to override their desire (Xie, Pei & Su, 2019) and assess the implication of the allocation, social understanding contributes to the development of fairness that occurs across the early and middle childhood. However, our data do not suggest any significant effects of these subscale measures on fairness development. One apparent reason is that these specific items are scaled differently from the overall ToM scores. A bigger sample to improve the analysis power is also suggested for future research.

5.5.3 Allocation Effect (AI vs DI)

The third finding that warrants further analysis was that the variation of allocations also mediates children's responses. For example, children were more likely to reject DI, but they reported more sadness when they received an AI. This suggests that a sensitivity to disadvantage operates in parallel with a broader consideration of fairness in young children. Children's rejection of DI has been well documented, as discussed earlier. However, the aversion of AI seen in some trials may reveal something more interesting. Children develop the ability to assess the implication of the allocations with age, but they may also invest in understanding the implication of their reaction to the allocation. Avoiding showing favouritism to oneself is particularly important (Choshen-Hillel et al., 2015; DeScioli & Kurzban, 2013; Shaw, 2013). This awareness becomes stronger with development and older children are especially concerned to appear to be fair (Shaw et al., 2016).

5.5.4 Cultural Effect

Fourthly, on the question of cultural difference, we found that British children seem to act more fairly than their Chinese peers by rejecting more allocations. They also felt happier about making such rejections. One possible explanation could be the extremely rare occurrence of rejection in the Chinese sample. This was nearly three times larger and yet they rejected only one third of allocations as their UK peers. Instead of taking this as an indication

of different levels of fairness understanding, we are inclined to perceive it as an effect of authority that we examined previously. Children from these two different cultural backgrounds undertake authority commands differently. British children feel more comfortable about challenging adults' decisions, but Chinese children hesitate to do so (Mei & Lewis, 2021 [Chapter 4]). Meanwhile, British children also showed a different attitude towards different recipients. For example, they expressed sad feelings when they rejected sharing an allocation with a friend or sibling. They were even more likely to agree to a DI if this was with a friend. This may be an indication of a strong in-group favouritism in allocation tasks. Based on social identity theory individuals, even children, engage selectively in a fair and prosocial manner with people who share the same group identity with them (Frederickson & Simmonds, 2008; Hepach, Vaish, & Tomasello, 2013; Tajfel & Turner, 1986). Young children identify friendship as a significant driving force within their social interactions. To benefit a friend not only triggers positive feelings but also children feel more obligated to do so. Hence, it becomes a dominant normative rule to share equally with a friend (Clark & Mills, 1993; Frederickson & Simmonds, 2008; Lagattuta, 2005; Yu, Zhu & Leslie, 2016).

5.5.5 Relation Effect

However, close relationships may also drive children in an opposite direction towards fairness. Although children may have taken the task presented here as a fun game and felt happier when playing it with a close friend, as soon as they discovered that they could be disadvantaged in the allocation relative to a friend or sibling, the sour taste of social comparison kicked in and they were more likely to reject the allocations. Children appeared to be happy to give away rewards to avoid being disadvantaged (Blake & McAuliffe, 2011; LoBue et al., 2009; Sheskin, Bloom & Wynn, 2013). Therefore, they became happier when they rejected a DI with a friend. Meanwhile, the story changed again when the recipient

switched to a sibling. This is likely to be related to the different family structures in China and UK. The 'One-child' policy in China meant that there are many singletons in nurseries. Fifty four of 100 Chinese children in our study has a sibling but among the 39 British children we tested, only 10 of them are singletons. Compared to their peers in the UK who can benefit from this close relationship and experience resource disputes more often, many Chinese children lack sibling interactions and may be left disadvantaged.

From age 3, children are very familiar with kinship terms and they spend a considerable time playing with their siblings (Benson & Anglin, 1987). Young children face disagreement, opposition, and clashing viewpoints on a daily basis in family interactions (Dunn & Munn, 1987). Disputes with siblings are likely to be particularly influential. Children grasp how to negotiate, persuade, and reconcile differing points of view through sibling disputes (Herrera & Dunn, 1997; Katz, Kramer, & Gottman, 1992). Specific factors such as birth order may have distinctive influences on fairness development. Older siblings can play a protective role within sibling interactions (Gass, Jenkins, & Dunn, 2007). '*Zun Lao Ai You*', which means 'respect the old and love the young', is one of the core ideologies of traditional Chinese culture. Older siblings are educated to be generous with their younger siblings and give their treats to a younger one in China. Therefore, the family provides the perfect environment for young children to practice social norms, in which fairness is especially emphasized to maintain the harmony between siblings.

5.5.6 Conclusion

This paper has attempted to examine the link between children's social understanding and their fairness understanding. In the tasks presented here, young children benefit from the ability to override self-interest and focus beyond the allocations that they are presented with. We found that performance on Wellman and Liu's Theory of Mind scale as a whole, but not individual items within it, was coupled with a propensity to reject allocations. This does not

necessarily imply that social understanding is the sole driving force behind children's developing reasoning. Other factors like perspective taking need to be considered in future research. Further studies are required to analyse the effect of ToM with different age groups and to explore in greater detail the possible links between component parts of social understanding, especially those subscales of ToM, and a range of fairness skills. The research summarised in the introduction has concentrated on false belief as a proxy for 'theory of mind' but our emotional reaction to the divisions of spoils in fairness tasks, also involves a range of mental states, including emotion. Our use of the child's emotional response to the allocation seems to have served as an informative measure of young children's understanding. Not only are they still developing their language abilities and may be unable fully to describe their reasoning behind their decisions, but children's (and adults') reactions to such divisions of resources take place at least in part on an emotional level. The combination of fairness and 'emotion' reactions by the child, coupled with a mental state measure which encompasses emotion may provide further insight into both the earlier transition of 2.5- to 4.5-year-olds' fairness development and how this builds into further changes which unfold in middle and later childhood.

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Chapter 6: General Discussion

6.1 Summary of Results

The literature surrounding fairness indicates the strong influences of various moderating variables that embedded in social contexts on children's fairness development and the lack of empirical data that reveals children's fairness principles alongside with the trajectory of fairness.

6.1.1 The Cost of Fairness

In chapter 2, we set off to explore the effect of three structural factors (age, gender and culture) and three contextual manipulations (cost, competition and relation) on children's fairness judgement that varied on three levels (fair, advantageous and disadvantageous allocations). Our results partially support the effect of each variable that has identified by previous literature, in which older children, Chinese children and females tend to act more fairly across all trials. The presence of cost and competition decrease fairness judgements. Children treat an unknown peer more fairly but are more flexible with a friend recipient. The more exciting findings are that these effects all interact with each other and we found that they use cost as the central hub to collectively influence children's fairness judgement. These subtle interactions reveal the dynamic nature of social influences and individual differences in early fairness development, which is summarised in a Dynamic Cost Model that was presented in the Discussion section of that paper.

6.1.2 Justification for Fairness Allocation

In Chapter 3, we followed up on the importance of social interactions that were revealed in our first study to explore the fairness principles that guide children's judgements by examining their justifications after the allocations in situations that involved manipulations of cost, competition and relation. We found that both older and Chinese

children are more likely to use norm-based justifications in their allocations. As for the contextual manipulations, desires are mentioned more often in trials in which a cost is incurred, and affiliation becomes the main consideration when children share resources with different recipients. These results suggest that children's fairness justifications to their judgements are consistent and depend on the contextual cues that are presented in order to influence their allocation. When these cues are made available, even 3- to 5-year-old children are able to demonstrate shifts in their moral reasoning ability. This suggests that pre-schoolers already possess a deep understanding of fairness principles.

6.1.3 Authority in Fairness Understanding

In Chapter 4, we took the investigation of social contextual effects further, by integrating them more deeply within cross-cultural variations. We looked, particularly, at how children from China and the UK react to inequalities made by different authority figures. Comparing children's judgements toward dividers of resources with different attributes and social roles, children show the highest obedience to teachers, then unknown adults, followed by puppets are treated as least powerful. They reacted most against unfair treatment that disadvantaged themselves. The influence of authority also appears to decrease with age, but is manifested more strongly in Chinese children, despite their subtle disagreement to the teachers' allocations. Furthermore, external environments, such as the difference between the school and shop settings, also moderate children's judgement about which morality is strongly articulated about distributions in the former. We also found that children's judgements were again coupled with their justifications, which highlights the close prediction between the social context and children's authority related justifications.

6.1.4 Social Understanding in a Fairness Game

The studies here have investigated many social factors that affect children's fairness, but cognitive ability has also been reported as influential as social factors are on fairness.

However, the mixed results from previous research makes it difficult to draw any conclusion on the question. In Chapter 5, we focused on the role of social understanding, or 'Theory of Mind', as one of the most discussed concepts of cognition, on children's early development of fairness, using an inequality rejection game, especially the period of 2.5 to 4.5 years. Our results suggest that this more general social skill facilitates children fairness understanding by prompting young children to reject more inequalities, especially those in which they were disadvantaged. More rejections were also found in the British sample compared with Chinese children, regardless of the allocation being made. Moreover, children's reactions to different allocations are significantly associated with their emotional responses. Children who are disadvantaged with a friend are not only more rejective but also more likely to feel sad about the allocation.

6.2 Integration of Results and Implications for the Literature.

6.2.1 The Trajectory of Fairness

Despite the trajectory of fairness that can be potentially summarised from previous literatures, there is no systematic study that has taken full account of the influence of both various social manipulations and serval individual differences in children's early development of fairness. Such a design would be more ecologically valid in terms of identifying the range of factors which compete to influence children's daily activities. In addition, the wide application of complex economic games, namely the Dictator Game and the Ultimatum Game, appears to lead to an underestimation of children's fairness understanding, especially for young children who are limited in their cognitive development. Therefore, we focused on the age window of 2.5 to 7 years that covers both the critical transition period (age 2.5 to 5) to some understanding and the profound developmental stage (age 5 to 7) in which this is expanded upon and can be articulated more fully, to provide a more complete understanding of the initial development of fairness principles.

Our results across all four studies present evidence that is in favour of the general trajectory of fairness understanding and paints in a few more details about the developmental progression. After infants exhibit elementary prosocial, altruistic and sharing behaviours by the second year (Eisenberg, Fabes & Spinrad, 2007; Rheingold et al., 1976; Warneken & Tomasello, 2006; Zahn-Waxler et al., 1992), children start to grasp the basis of fairness (Eisenberg, 1989) that will serve as the foundation of morality through adolescence (Piaget, 1932) and beyond (Kohlberg, 1981). Many studies report that 3-year-olds typically demonstrate poor fairness behaviours. For example, they fail to make equal allocations, prefer to keep more resources to themselves and only reject disadvantageous allocations occasionally (LoBue et al., 2011; Takagishi et al., 2010). However, the third year of life still plays a vital role in marking children's understanding of fairness. Their performance on fairness allocation may be impaired by the powerful motivation of self-interest (Fehr & Fischbacher, 2004; Gummerum et al., 2010), but their understanding of fairness is developing rapidly at this early age. Regular exposure to fairness conflicts at this stage contributes to the formation of their preference of fairness. This generalises their knowledge to include moral understanding and reasoning abilities (Gummerum, Keller, et al., 2008; Harbaugh et al., 2003; List & Cherry, 2008). Development at this stage leads to a better understanding of fairness in children older than 5 years. Five- and 6-year-olds benefit from these valuable experiences and reflect on their behavioural performance to perform more fair allocations. This is consistent with studies that show older children have a strong fairness tendency and a developing ability to reject advantageous allocations (Blake & McAuliffe, 2011; McAuliffe et al., 2017; McAuliffe et al., 2014; Williams & Moore, 2014; Williams & Moore, 2016).

Accounting for the cultural variations found in this thesis, the trajectory of fairness seems to vary between China and the UK. Chinese children consistently to display the concept of fairness about two years earlier compared with their peers from the UK. In the

studies presented here younger Chinese made allocations based on the principle that were shown only in older British children. This seems to reflect each culture's characteristics, in which people from collectivist cultures weight fairness more heavily than do those from individualist societies (Henrich et al., 2005; Oosterbeek et al., 2004; Rochat et al., 2009). However, the data presented here also seem to be slightly at odds with Blake's (2015) study that investigated the ontogeny of fairness in seven societies. Two of the three countries that showed earlier development of advantageous inequity aversion in his study are individualist societies, Canada and the US. Such an achievement is not reached until later childhood. The high regard of social reputation in these countries that is evidence in younger children has been cited as the reason for this difference (Lehmann & Keller, 2006). However, this explanation does not explain why the British samples studied here showed poorer performance in trials in which they were advantaged (Study 3). One possible reason could be the different number of resources used in two studies: 1:4 in Blake (2015) vs 1:3 in Study 1. Such a discrepancy between different allocations might affect children's judgement dramatically and perhaps this is demonstrated in different ways by children in different cultures. The increase of the discrepancy between the two allocations decreases children's fair behaviours (Williams & Moore, 2014). Moreover, there are no additional effects presented in Blake's study apart from the two forms of inequality. Although British and Chinese children's performance is compared in trials that do not involve any social manipulations, due to the nature of repeated measure employed in current study, it is possible that there was an influence of different social factors being examined that may have interacted with cultural variation in a subtle way, for example, authority is perceived differently in different societies, in which British children seem to be more comfortable to challenge their teachers.

6.2.2 The Importance of Social Context

The presence of social factors does not only affect children's explicit performance on fairness but it also facilitates children's understanding of the fairness principle that underlies their judgements. For young children, every fairness judgement is a battle between their desires to maximize the rewards and social norms that should be conformed to (Sanfey et al., 2003). In game theory, where these allocation games originally come from, the Homo Economicus Model claims that individuals always seek maximum benefits regardless their role as a consumer or a producer (Rittenberg & Tregarthen, 2012). Although adults are able to enact fairness by closely adhering to a complexity of guidelines, and even make sacrifices of own resources to avoid perceived inequalities (Camerer, 2003), young children struggle to escape from the dominant force of self-interest and their motivation is to allocate more resources to themselves either as a distributer or a recipient (Benenson et al., 2007; Sanfey et al., 2003). This overwhelming selfish motive constrains children's attention on allocations. It is clearly reflected in the centrality of cost factor in our dynamic model that assesses the social complexity on fairness judgement.

However, the input of social contexts brings in many other factors influencing performance. Children actively evaluate variations, such as whether there is a cost to maintain fairness, who they are sharing resources with and if the trial involves competition. These factors introduce a set of competing forces and coincidentally they seem to help children strike a balance between selfishness and fairness (Engel, 2011; Vaish & Warneken, 2012). These constraints are especially beneficial for young children. The results from studies 1 and 2 suggest that even three-year-old children can judge and justify allocations correctly when presented with contextual cues that channel their allocations. With age, children become less self-focused and attentive to multiple sources (Piaget, 1932; Hook & Cook, 1979). The Social Information Processing Model identifies that children's actions and

responses are inflected by their understanding of social contexts and that they have a growing ability to integrate more contextual cues to adapt their behaviours (Crick & Dodge, 1994 ; Arsenio & Lemerise, 2004). When desires and norms are no longer the only forces considered by children in fairness allocations, a third force of wider social influence becomes a mediator. Children at this early stage are likely to behave in a way in which they should 'appear to be fair'. They show considerations of fairness but not necessarily enduring moral principles (Shaw et al., 2014). For example, the presence of an audience enhances children's fairness dramatically (Leimgruber, et cl., 2012). They hold concerns about managing good social reputations that lead to fair allocations, which is another form of maximizing personal benefits. Meanwhile, they also realise the expectations of social norms and the necessity of adhering to them. This is coordinated by social factors as the third force to provide the relevant contexts.

6.2.3 The Learning Process of Fairness

The importance of social context also sheds light on children's learning of social norms and principles. When engaging with social stimuli, children test the boundary of social expectations and observe behavioural rules (Sripada & Stich, 2006; Turiel, 2006). When presented with three types of allocations (equal, advantageous and disadvantageous), the data from Study 4 show that 3-year-olds may reject all allocations. They do not adhere strictly to the principle of fairness, by only rejecting the two inequalities. With one third of the allocations are fair, they appear to be attempting to align their behaviours to this social expectation. Perhaps the use of these three types of trial provides children with the opportunity to practice and experiment their understanding of fairness to resemble that observed in adult actions. Adults, especially parents, internally foster sharing norms in their offspring and believe that children do adopt behavioural rules from them (Blake et al., 2016; Greenfield et al., 2003). Children as young as 2 years old imitate adults' actions that enforce

norms (Carpenter, Akhtar, & Tomasello, 1998; Gergely & Csibra, 2006; Hardecker & Tomasello, 2017; Meltzoff, 1995). This experience forms the basis of their fairness system and gradually generalises into advanced moral principles.

6.2.4 The Flexible Contextual Principle

Moreover, the learning process of acquiring social norms from socialization also generates fairness principles for young children to justify their allocations when inequalities cannot be avoided. Instead of having fixed and simple principles that are limited to certain situations (for example the three main principles that are widely agreed: the need principle in a charity situation, the merit principle in a collaboration, the agreement principle, e.g. the winner takes the rewards in a comptition [Deutsch, 1975; Feinberg, 1970, 1974; Hamann, Warneken, Greenberg & Tomasello, 2011; Lerner, 1977; Paulus & Leitherer,2017]), children seem to rely on contextual cues to absorb social norms and extract new principles that reflect on the situational priority. This is supported by the consistency between our experimental manipulation of social factors and children's justification after their allocations in studies 2 and 3. For example, when sharing with different recipients, none of the three basic principles takes effect and children seek the role of affiliation to identify the correct course of action. This indicates that children actively evaluate the situation and strategically create principles to serve the contextual challenge. They do not rigidly follow general principles when they realise the benefits of applying a more flexible approach.

6.2.5 The Role of Culture and Tom

However, our stress on the importance of social influence should not be treated as the only factor that affects children's fairness development. Although an understanding of fairness is rooted in their interpretation of social contexts, these social variations are deeply stamped by cultural processes (Tomasello, 2016). The differences between British and Chinese children's fairness judgements and justifications across all four studies provide

strong evidence to highlight the contribution of culture in this process. Chinese children growing up in a collectivist society that emphasizes authority and obedience (Mackerras, 2001; Worden, Savada, & Dolan, 1988), are more tolerant to inequalities made by a teacher. Compared with Chinese participants' advanced performance identified in the study 1, their agreement to inequality in study 3 indeed shows how subtle is the interplay between social contexts and cultural variation. As young as three years old, children's responses to norm violations depend on their cultural values (Rakoczy, Brosche, Warneken, & Tomasello, 2009; Rakoczy, Warneken, & Tomasello, 2008). The difference between of collectivist and individualist cultures leads children to different perception of self and morality concepts, in which authority is regarded higher in the former type of society (Markus & Kitayama, 1991; Shweder & Bourne, 1982; Shweder, Mahapatra, & Miller, 1987).

Furthermore, cognitive development provides the fuel to facilitate this process. During the trial and error practices we sketched above, children with better 'Theory of Mind' (ToM) abilities reject more allocations. This result from study 4 suggests that ToM helps young children to process and evaluate the social context more effectively, at least in terms of being confident to reject an allocation. The effect of ToM on fairness has long been debated in developmental psychology and still there is no clear conclusion to be drawn from the research (studies in favour of ToM effect: Rochat et al., 2009; Takagishi, Kameshima, Schug, Koizumi, & Yamagishi, 2010; Wu & Su, 2014. Studies against the ToM effect: Castelli et al., 2010; Castelli et al., 2014; Sally & Hill, 2006; Lucas et al., 2008; Mulvey et al., 2016). Integrating our results from study 4, the data propose a different contribution of ToM that has been overlooked at by previous studies. For young children, especially 2.5- to 4.5-year-olds with limited cognitive resource, ToM development may not influence their fairness judgements by increasing concerns for others' perspective or welfare as suggested by other studies (Caputi et al., 2012; Farrant et al., 2012; Paulus & Moore, 2015). Instead, it simply

provides the ability for young children to strategically assess the contextual cues presented in the situation. If this were the case, children would have more options available from the social contexts to experiment with behaviours that would finally meet fair expectations.

6.3 Limitations

The most important limitation of these studies lies in the fact that repeated measures design is used in all the studies. As reported in each study, each participant was assigned to 6 similar trials that vary on different manipulations: a 2X2x2 (cost*competition*relation) designed used in chapter 2 and 3, a 2X2x2 (authority*treatment*setting) designed employed in chapter 4, a 3X3 (recipient*allocation) design in chapter 5. Although we cannot fully eliminate the carry-on effect of repeated testing, we took various steps to minimize its interference on the results: we randomised the order of the presentation of each condition to avoid the possibility that children would identify a response which works in all trials. We also employed different objects as the rewards in each allocation, for example, apples and strawberries were used in a counterbalanced order to present rewards. However, children's systematic responses and the strong beta values which suggest a better prediction effect found in each study suggest that any influence of this experimental design on their performance was minimised.

In chapters 3 and 4, the lack of complete transcript data on children's justifications (due to ethical restrictions) is a second potential limitation. This should be avoided in future studies. However, we used a semi-open scheme to classified children's justification and about 85% of the responses fell well into the two predefined categories, desires and norms. The 15% unexpected answers occurred sufficiently frequently and can easily be distinguished from each other. Therefore, they were coded during the testing. When we invited a second coder who has no connection with the project at all to classify some sample responses from

children, Cohen's Kappa coefficients are around 0.8 which indicates the strong agreement between the two coders and the high reliability of the results (McHugh, 2012).

Although the aim was to make the samples representative of children from China and the UK, an unbalanced sample set that short of British children was used in chapter 5. The original plan was to test one hundred children in each country. I collected the Chinese data two years ago and achieved the approximate number as planned. However, when the testing was due to be carried out in the UK, this had to be aborted by the Covid-19 outbreak as all schools in England were issued with closure by the government.

6.4 Future Directions

6.4.1 Methodology

The current project has provided extensive evidence in supporting the effectiveness of the methodological innovations employed here for testing children's fairness performance. For example, it is recommended that further research should develop the paradigm that presents all three possibilities of allocations (equal, advantageous and disadvantageous) in the same trial. In addition, more attention should also be paid to children's justifications after their allocations. I used two forms of justification measurements in this project: verbal responses that are suitable for older children and emotional responses which are more appropriate for younger children. In further studies reaction times and looking behaviours could also be considered as additional measures of children's reasoning process (LoBue et al., 2011). To apply a combination of both judgment and justification assessment is critical to capture the full picture of children's fairness understanding.

6.4.2 Cogitative Domain

More broadly, research is also needed to determine the role of the variety of factors involved in cognitive development in our understanding of children's fairness performance.

The Dynamic Cost Model provides a complex foundation for theorising the role of social interaction on children's fairness judgment. It would be interesting to extend its scope to the cogitative domain to include, for example, measures of verbal competence, mathematical skills and inhibitory control. All these factors have been reported to facilitate children's fairness related behaviours (Blake et al., 2015; Damon, 1975; Gunzburger et al., 1977; Hook, 1978; Lane & Coon, 1972; Larsen & Kellogg, 1974; Lerner, 1974; Paulus et al., 2013; Paulus et al., 2015; Smith et al., 2013). This would help us to establish a greater degree of accuracy on this matter.

6.4.3 Procedural Fairness

We focused exclusively on distributive fairness in this project, which mainly concerns the allocation of resources between children and another person. However, considerably more work will need to be done to determine another form of fairness that examine how resources should be allocated, so called procedural fairness (Aquino et al., 1997; Shaw & Olson, 2014). This area of study has shown interesting results in comparison to distributive fairness and appears to be an ability that is easier to master (Grocke, Rossano & Tomasello, 2019; Surian & Margoni, 2020). For example, when children play fairness games with different recipients, their relationship has a heavy role to play in their allocation decision, which is also supported by data from the current study. However, when procedural fairness is taken into account, the relationship becomes less influential and fairness is the new priority (Li et al., 2018). The issue of procedural fairness is an intriguing one which could be usefully explored in further research in order to bring new insight on the naturalness of fairness.

6.4.4 Cultural Varication

Research has been limited in terms of its generalizability, as normally only one population is under investigation. However, the strong cultural varication has been shown in these studies to interacts with many other factors. The different ontogenies and social

perceptions of contextual cues demonstrated by British and Chinese children in the current studies, leads to the conclusion that more empirical data are needed to construct a more ecological and systematic model with an even greater diversity of populations. Such research should focus the interactions of influential factors that are especially embedded with cultural variations rather than cultural diversity per se. This series of studies provides strong evidence for the distinctive effect of factors like authority and the importance of the normativity in British and Chinese children's attitudes towards inequalities.

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