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Jinyi Zhang   April 10, 2017

Inequity Aversion and Altruism in Children of Three Cultures

by

Jinyi Zhang

Philippe Rochat
Adviser

Department of Psychology

Dr. Philippe Rochat

Adviser

Dr. Stella Lourenco

Committee Member

Dr. Bradd Shore

Committee Member

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By

Jinyi Zhang

Philippe Rochat

Adviser

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Abstract

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By as early as 15 months, children show emerging signs of inequity aversion and altruism. However, past studies on the two topics largely focused on decision-making that involves dividing positive objects. Little research has been done to investigate whether the egalitarian tendency or altruistic tendency would change when children have to make decisions about harm inflicted on themselves or others. A study consisting of three games captures the development of inequity aversion and altruism from a cross-cultural and developmental perspective. Two hundred and twenty 3-14 years old children from Samoa, China and the US were tested for three games. In the first game, children were asked to choose between equal and unequal allocations of rewards. The second game mirrored the protocol of the first game; the difference was changing the rewards to negative consequences. In the two games, American children behaved the most egalitarian, Chinese children behaved the most altruistic and Samoan children displayed the most conflicting interests. We observed a developmental trend of egalitarianism when sharing rewards, and a trend of altruism when sharing harm. Children's behavioral type in the candy game was correlated with their behavioral type in the bug game. In the third game, children were asked to inflict pain on themselves versus others in exchange for rewards. While children from other combinations of age groups and cultures did not differ in their level of pain chosen for themselves and others, older Chinese children inflicted significantly less pain for others compared to the pain they inflicted on themselves, indicating high levels of altruism. Children's behavioral types in the first two games were not correlated with their choices in the rubber band game. Results are discussed in the context of different cultural theories and empirical research in development, and answered the question of how children's emerging egalitarianism and altruism are jointly shaped by age and culture.

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Inequity Aversion and Altruism in Children of Three Cultures

Other-regarding preference is a broad term referring to the concern of the welfare of others. It is considered a central piece of the complexity of human behavior, and it includes a wide array of social cognitive processes, such as fairness, empathy and altruism. A large body of research has challenged the assumption that individuals will act solely based on self-interest in social exchange. By 5 years, children start to display egalitarianism when distributing sweets between self and an anonymous partner (Fehr, Bernhard and Rockenbach, 2008; Rochat et al. 2009). Infants as young as 15 months begin to show emerging altruism in the form of sharing their preferred toys with a stranger. Those are phenomena that are manifested from early childhood and throughout adulthood. The construction of other-regarding preferences is also heavily dependent on culture and social interactions. For example, although inequity aversion, (i.e., the preference for fairness and disliking for inequality), is generally expressed in all cultures, there are however considerable differences in the magnitude of its expression across cultures (Henrich et. al, 2010).

In this paper, we first review the literature on inequity aversion and altruism from both a developmental and cross-cultural perspective. Then we present the current study, an empirical research consisted of three games conducted with children in Samoa, China and the US. We report the methodology and the results of the study, and discuss the findings and its implication, as well as directions for future research, before concluding the paper with a summary of the main ideas.

Sharing in Development

Just like other social cognitive processes, sharing behavior is deeply rooted in human development. By as early as six weeks, infants start to show active sharing of affects. They display socially elicited smiling, and their gaze becomes shared and mutual. Many parents notice their babies begin to look at them rather than gazing past them. Through play and socialization with caregivers, infants learn the quality of social attention they are able to elicit and receive from others. This early affective sharing is the original ground where self and other engage together in an open-ended, emotional turn-taking process. It is from this point on that we can talk about sharing in the sense of reciprocal exchanges (Rochat & Robbins, 2016).

By approximately 7-9 months and up, infants start to engage in referential sharing with others about objects in the world that are beyond the dyadic exchange (Rochat & Robbins, 2016). For example, infants will often look back and forth between the adult and the object to create joint attention. This new triangulation has an important role in the development of infants' social affiliation and togetherness. By 11-12 months, children begin to imitate or to coordinate behaviors in attempts of cooperation. For example, picture an adult and the infant are playing a game where the adult holds a basket and the infant throws toys into it. If the adult puts the basket down and shows intention to throw the toys, 12 month-olds will be able to stop throwing and hold the basket for the adult to throw toys (Carpenter, Call & Tomasello, 2005). Turn-taking behaviors as such indicate that children are now changing from being completely egocentric to having the emerging ability to "get into others' shoes".

After 21 months, children develop an explicit concept of ownership. Parallel to this, they also start to gain self-recognition in the mirror (Rochat & Zahavi, 2011), as well as self-conscious emotions such as shame, pride, or envy. At this stage, children become sensitive to

and actively manage their own reputation, largely due to the emerging awareness of others as audience and evaluators (Rochat, 2013). They start to manipulate what they expose to others, also constantly seeking approbation from others. This need for social affiliation and approval develops into the internalization of group norms and ethical stance. Children as young as 3 years-old endorse the norm of equal sharing both to themselves and others, although their behaviors don't exactly reflect the norm until 7-8 years-old (Craig, Blake & Harris, 2012). A number of studies show that children start to share significantly more equitably by age five, and become mostly egalitarian by age seven to eight (Craig, Blake & Harris, 2012; Fehr, Bernhard & Rockenbach, 2008). As children start manifesting an ethical stance, they start to identify with the groups and show in-group biases. Study shows that 3-4 year-old children tend to reverse their own perceptual judgements in order to fit a majority opinion from their peer group (Corriveau & Harris, 2010; Corriveau, Kim, Song & Harris, 2013; Haun & Tomasello, 2011; Haun, van Leeuwen & Edelson, 2013). The in-group/out-group dynamic also influences how children share with one another. Research shows that children share more favorably towards in-group members than towards out-group members (Fehr, Bernhard and Rockenbach, 2008), demonstrating the importance of group belongingness and fear for social exclusion.

Sharing in Different Cultures

Sharing as a product of socialization is greatly linked to the larger framework of institutions. Research shows that children's sharing behavior resembles the behavior of adults from the same community (House et. al, 2013), indicating that the acquisition of fairness behavior in childhood is largely shaped by the collective rules and norms that govern exchanges in general. The studies reviewed above are mostly conducted with W.E.I.R.D. (Western,

educated, industrial, rich, and democratic) populations (Henrich et al., 2010). This brings up the question of generalizability of the findings in cultures different from such contexts.

Several theories have been thought out in attempt to explain the role of culture in sharing behavior. The first one is the theory of collectivist vs. individualist culture (I/C). I/C is arguably the most researched and studied cultural dimension in cross-cultural psychology (Triandis, Chen, Chan, 1998). The term individualism was first used by Hofstede (1980) to describe societies that placed more emphasis on the individual, the individual's interests, and the individual's achievement, than those of the group's. In contrast, collectivism refers to societies that place importance on the group and the group's interests and achievements. The most typical countries that adopt individualist culture are the US and Europe, whereas East Asian countries, especially China, are thought to be the torchbearers of collectivism. It is possible that the collectivist and communal lifestyle predisposes children to egalitarian or generous ways of sharing (Rochat & Robbins, 2016). Already by three years old, children from collectivism and small-scale subsistence living societies (e.g., Samoa or rural Peru) showed heightened egalitarianism and generosity as compared to those from individualistic and highly urbanized societies (e.g., United States) that show a steeper developmental trend between three and five years (Rochat et. al, 2009).

However, this explanation does not seem to tell the full story. In a study that compared six highly contrasted cultures, House et. al (2013) found that small-scale communities fell on both ends of the sharing spectrum, displaying both heightened egalitarianism and stinginess. Another study found that children from a communal Tibetan society in India did not differ from other cultures in terms of sharing behavior (Robbins, Starr & Rochat, 2016).

Another theory explaining the interaction between culture and fairness is the theory of ethic of justice vs. ethic of care. Ethic of justice, proposed by Kohlberg (1958), refers to the expectation that all people will be treated "equally and equitably" (Connor, 2009; Kohlberg, 1958). Thus, they prefer equality instead of any forms of inequality (Blake et al., 2015; Herrmann, Thoni & Gachter, 2008; Henrich et al. 2010). Ethic of care, observed by Gilligan (1993), was first proposed to address the differences in moral development between men and women. Gilligan found that girls and women were more generally focused on sustaining connections and that the primary motivation of her subjects in making moral decisions was maintaining relationships and caring for others (Connor, 2009). The motivations behind sharing behavior could be considered as a negotiation between individual ownership rights and others well-being. Studies have found that an ethic of justice is preferred by US teachers (Conner, 2009), whereas Chinese parents emphasize social obligation, propriety and benevolence that sacrificed individual needs for the needs of the group (Chuang & Su, 2009; Lew, 1998; Ma, 1989; Rothbaum, Morelli, Pott, & Liu-Constant, 2000). As the result, when Chinese children were asked to provide reasons for their suggestions in a hypothetical situation in which there were conflicts between conforming to rules and fulfilling personal goals/desires, they gave explanations that was categorized as care-based morality that focuses on the importance of pro-social behaviors (Wong, 2010).

A third theory focuses on the concepts of market integration and community size. Market integration here is defined as the percentage of purchased calories in diet. Large-scale, intensely cooperative societies require a great number of one-time transactions with strangers that are efficient and mutually beneficial. The development of social norms such as fairness, trust and cooperation helps to lower the transaction costs, thus increasing the frequency of beneficial

transactions and the long-term rewards (Henrich et. al, 2010). In contrast, studies of non-human primates and small-scale societies suggest that during most of our evolutionary history, transactions with nonlocal groups and with foreign ethnolinguistic units were rife with danger, mistrust, and exploitation (Johnson & Earle, 2000; Diamond, 1997; Fehr & Henrich, 2003). A research conducted in 15 cultures, including hunter-gatherer, horticultural, foraging, and urban societies, discovered that market integration is positively correlated with fairness behaviors, and larger community size predicts greater punishment for unfairness (Henrich et. al, 2010).

Altruism

Altruism is the practice of selfless concern for the well-being of others. This term captures a variety of human behaviors, from donating money to charity, to the heroic behavior of saving a child from drowning. In the animal kingdom, a large array of altruistic acts is also found among social species. Vampire bats often regurgitate blood to roost-mates that fail to find food (Carter & Wilkinson, 2013). Ground Squirrels make shriek sounds to alarm others when predators approach, putting themselves at risk for being spotted by the predators (Sherman, 1980; Dunford, 1977). These commonly observed, yet seemingly, evolutionarily disadvantaged behaviors attract the interest of biologists and social scientists. In attempts to solve this conundrum, several models have been proposed. The first two are kin selection and care-based altruism. Kin selection model states that an individual is more likely to help another individual if they are genetically related (Haldane,1955; Hamilton 1964). The closer the relationship, the higher chance of helping behaviors. This model most clearly explained the altruism observed in colony-based eusocial species, such as honeybees and rats, since they are all progeny of the queen in the colony, thus sharing a strong genetic tie with other colony members (Marsh, 2015). The care-based altruism model explains the parental caring behavior in mammals. This caring

behavior could also be extended to the offspring of unrelated species members, even vulnerable adult members. It is elicited by infantile features and perceived emotional distress, and it is strongly linked to the production and reception of oxytocin, a neurotransmitter related to childbirth and social bonding (Marsh, 2015).

Those two models explain altruistic behaviors observed among individuals with genetic relationships, showing that altruism has a deep evolutionary root. A third model for understanding altruistic behavior toward non-kin is reciprocal altruism. This model suggests that people are more likely to help others who have helped them before, or might be helpful in the future. Thus, reciprocal altruism is most commonly seen in communities where people interact with each other frequently or belong to mutually dependent social circles. However, what is the mechanism when people are benefiting others at cost to themselves, knowing kinship and reciprocity are not expected? Crockett et al. (2014) conducted an experiment where they asked adult subjects to trade off profits for themselves against pain experienced either by themselves or an anonymous other person. In each trial, the participants were given two choices: more electric shocks paired with higher payoff, or less electric shocks paired with lower payoff. In trials where the shocks were delivered to themselves, the participants tend to choose the 'more shocks-high payoff' option, and choose the 'less shocks-low payoff' option in trials where the shocks were delivered to the partner. This study demonstrated the phenomenon of "hyperaltruism" in decision making in a non- hypothetical situation, which is that most people prioritized others' pain more than their own pain and were more willing to sacrifice their profit to reduce others' suffering than to reduce their own suffering. Several reasons for this have been proposed. One of them is empathy. Empathic concern is defined as the other-oriented, tender state experienced when seeing the distress of others that promotes altruistic behaviors aimed at relieving the distress (de

Waal, 2009; Batson, 2010). A functional magnetic resonance imaging (fMRI) study shows that witnessing others in pain engages brain regions similar to those that respond to one's own pain (Singer et al., 2004). Another reason could be the aversion to causing bad outcomes, especially when it involves harming others. This moral sentiment could lead people to prioritize others' suffering more than their own suffering, in situations where they feel responsible for the harm (Crockett et. al, 2014). Acting altruistically in such circumstances can give the altruist "ease of escape", which is to avoid experiencing internal punish-based feelings and external social censure and condemnation (Smith, Lapinski, Bresnahan, & Smith, 2013). Several studies have reported such egoistic motivations in helping behavior in the absence of empathy (for review, see Batson, 2002).

"Hyperaltruism" and Inequity Aversion When Sharing Harm

Inequity aversion, defined as the preference for fairness and resistance of incidental inequality, is a popular topic for economists, sociologist, psychologists and anthropologist across the world. According to Fehr and Schmidt (1999), inequity aversion is characterized by two parameters: Envy, or the disapproval for disadvantageous outcomes (e.g., having less than others), and compassion, or the disapproval for advantageous outcomes (e.g., having more than others). Results from exchange games has substantiated this position, indicating that adults make offers that are very close to an even split, and reject offers that are considered as too stingy, typically less than 20-30% of the shared good (Camerer, 2003; Murnighan & Saxon, 1998; Camerer & Thaler, 1995).

Extensive work has been done to study inequity aversion in adult resource sharing. However, no research to date has studied inequity aversion in dividing negative objects or undesirable consequences. Such choices are frequently encountered in real life, from dividing

tedious work to sharing unavoidable harm or losses. Individuals often object to inappropriate distribution of labor or harm, but it is unclear if the mechanism of such aversion is the same as the aversion for unequal division of resources. If individuals display less inequity aversion when dividing negative outcomes, there are two possible predictions: preference for advantageous inequality (e.g. taking less negative outcomes for self than for others) or preference for disadvantageous inequality (e.g. taking more negative outcomes for self than for others). Choosing advantageous inequality would demonstrate a higher level of harm-aversion for the self, and that an individual might empathize with other's pain, but he is less concerned about the harm experienced by others than the harm experienced by themselves. By choosing the disadvantageous inequality, the individuals prioritize other's pain than their own pain, indicating the presence of "hyperaltruism". It is unclear at what age people begin to adopt this "hyperaltruistic" valuation (Crockett et al., 2014). Research has shown that infants start to show early forms of altruistic behaviors as early as15 months of age, and such altruistic tendency is connected to the level of fairness displayed in the study. For example, babies who showed heightened sensitivity to the unfair distribution of food were also more likely to share their preferred toy (Schmidt & Sommerville, 2011). However, those altruistic behaviors observed in children are mostly prosocial behaviors that are at low cost to themselves, making them different from the "hyperaltruism" discussed in this paper. Studies are needed to elucidate the developmental timeline of "hyperaltruism", and to explore whether this higher form of altruism is present in non-WEIRD cultures.

Altruism in Different Cultures

Altruism in humans is demonstrated to have deep biological roots. Nevertheless, evidence shows considerable variation in altruistic behaviors among individuals and across

cultures. Research tends to agree that altruistic behaviors are observed more often in communal or collectivist cultures rather than in individualist cultures (for review, see Smith, Lapinski, Bresnahan, & Smith, 2013). Collectivist cultures center their values around social-connectedness, thus they have a more articulated system of social obligation in comparison to individualistic cultures, which place more emphasis on autonomy and personal choice.

An alternative explanation is to understand altruism as a performative action. In China and most East Asian countries, the face culture is prevalent, meaning that people are more likely to define themselves by how others collectively perceive them instead of how they perceive themselves, building their concept of self based on a third person perspective (Seo, Kim, Tam & Rozin, 2016). In contrast, the dignity culture, common in the US and West Europe, suggests that people tend to define themselves by how they see themselves instead of how others see them, understanding and judging the self more from a first-person than a third person perspective (Kim & Cohen, 2010; Kim, Cohen, & Au, 2010; Leung & Cohen, 2007). Thus, people from China and most East Asian countries might have a higher tendency to be altruistic when others are present, because they have a higher desire for social approbation and are more afraid of "loosing face" when their selfishness are caught by others.

The Current Research

Research aim. In an effort to shed new empirical light to the issue of inequity aversion and altruism in development and across cultures, in a study consisted of 3 games we explored the role of culture on the emergence of inequity aversion and altruism in sharing both positive and negative outcomes. The general aim was to address the question of how children from different cultures evaluate others' gain and suffering, relative to their own.

Three cultural contexts. Children from Samoa, China and the US were recruited. Below are brief sketches of each country.

Samoa: Samoa is an island country located in the Polynesian region of the South Pacific. Children were recruited from Faga and Lalomalava, two villages located on the east coast of the island of Savai'i (population approximately 50,000). Here is an excerpt from Odden and Rochat (2004) that describes the structure of Samoan society:

> The majority of the Samoan population resides in small 500- to 2000-person rural villages. Samoans live in relatively large extended, multigenerational families with an average household size of 7.6 persons (Department of Statistics, 2002). Children's development occurs in the midst of an extensive and flexibly constituted social network, which extends far beyond the immediate household (Mead, 1928; Mageo, 1998; Ochs, 1988). Economic activities are primarily oriented towards subsistence agriculture and fishing, although there is some employment in light industry and tourism. Political life is organised around the village council of chiefs (*matai*), who possess hereditary titles that entitle them to far-ranging political and economic powers within the village and within their extended families. Samoa is a representational government, yet most day-to-day political power is invested in these local village councils of *matai*. (p. 41)

China: China is the most populous country in the world with a population of over 1.381 billion. Approximately half the population in China lives in the urban area. Under the governing of the Chinese Communist Party, China is considered to be a prototypical collectivist culture, where the organization of the society is heavily dependent on "Guanxi", which is the personalized network of influence, or cultivated relationship with one another. This type of interconnected social structure stems from the Chinese social philosophy of Confucianism,

which emphasizes the importance of hierarchical relationships in order to maintain social and economic order (Luo, Huang & Wang, 2012). Despite the rapid transition in economy and the importation of Western culture, China is still heavily influenced by Confucianism tradition, placing emphasis on Five Constants: Ren (Benevolence), Yi (Righteousness), Li (Manner), Zhi (Knowledge), Xin (Trust). Shandong province especially prides itself for being the birthplace and hometown of Confucius, making Shandong a more traditional province in comparison to others. Over the past few decades, the economy of China has experienced drastic transformation, mainly due to the economic reforms that happened in the late 1970s. Modern-day China is mainly considered as having a market economy based on private property ownership. Children were recruited from a summer camp organized in Jinan, the capital city of Shandong province, and took place in Zibo, another city in Shandong province. Jinan has a population of over 7 million. Commerce industry and agriculture (in rural area) contributed greatly to the economy in Jinan. The children tested were mainly from urban middle class families, vast majority of them were the single child of the family.

The United States of America: The United States (population approximately 318.9 million) is a highly developed and urbanized country, with over 80% of population living in urban areas. The US is home to a variety of cultures brought by different ethnic groups, with Western European culture being the mainstream culture. The US has long been considered the torchbearer of the individualist culture, with its core value placed on liberty, equality, private property, democracy, rule of law, and a preference for limited government. The basic social unit in America is a nuclear family, which typically consists of a married couple and 2-3 children. Children were recruited from a private elementary school and an after-school program located in Atlanta (population approximately 318.9 million), Georgia, as well as through the Emory Child

Study Center database. Corporate operations play a major role in Atlanta's economy. The children tested were mainly from middle to upper-middle class families living in the Greater Atlanta area.

Three games. The first game was named the candy game. In this game, children were asked to choose between equitable and non-equitable positive outcomes shared between self and an anonymous partner. This game investigates inequity aversion in resource sharing and is a replication of a study designed by Fehr, Bernhard and Rockenbach, (2008). In the second game, named the bug game, we changed the objects being shared to negative outcomes (biting bugs) while keeping all other aspects of the first study the same. This game investigated inequity aversion when dividing harm or negative objects. Finally, the third game, named the rubber band game, was inspired by an adult study by Crockett et al. (2014). In this experiment, children were asked to inflict "pain" caused by rubber bands slapping on self versus an anonymous partner. Different levels of "pain" were paired with different levels of rewards. This study explored whether "hyperaltruism", demonstrated in the original study by Crockett et al. (2014) described earlier, will be also present in children, and how culture and age affect children's altruistic tendency in decision-making.

Rationale and hypotheses. Upon reviewing and synthesizing existing theories, we hypothesized that culture and age would have significant effects on children's sharing behaviors and pain distributing behaviors. Specifically, we theorized that American children would be the most egalitarian in the candy game and the bug game, because the high level of market integration in the US requires egalitarian behavior to increase the efficiency and frequency of one-time transactions among strangers (Henrich et. al, 2010). A second reason is the justice-based morality endorsed by most American teachers encourages equality and fairness in all

aspects of life (Conner, 2009). Chinese children were expected to behave the most altruistic among other cultures in the candy game and the bug game, because the collectivist culture and the ethic of care predispose children to adopt behaviors that promote social harmony and connectedness (Smith, Lapinski, Bresnahan, & Smith, 2013; Connor, 2009). It could also be caused by the concern for reputation typically present in the face culture (Seo, Kim, Tam & Rozin, 2016). Children from Samoa were expected to be the least egalitarian among all cultures, and display heightened altruistic tendency in the two games, due to the low level of market integration and the communal way of living that might predispose children to a more altruistic way of sharing. Based on past research, we hypothesized that older children across all cultures would display more egalitarianism as compared to younger children.

It is also expected that most children would display behavioral consistency between the candy game and the bug game, e.g. a child who was egalitarian in the candy game would be egalitarian in the bug game. However, for those children who changed their behavioral type from the candy game to the bug game, we predicted that most of the children would change towards the direction of altruism. This prediction was based on the study by Crockett et. al (2014), who found that adults were more concerned about others' suffering than their own, and were more willing to give up rewards to reduce others' pain than they would for themselves, due to the moral aversion of being responsible for causing bad outcomes in others.

In the rubber band game, we hypothesized that younger children across cultures would choose less harm for self than for the partner. Older children in China would be altruistic by choosing to inflict more harm on themselves and less harm on the partner in exchange for rewards. Older children in the US would be egalitarian by choosing to inflict similar amount of harm on themselves and on the partner. Older Samoan children would inflict more harm on

themselves and less harm on others, because of the expected lower level of egalitarianism and higher level of altruism. These predictions were based on the hypothesis that children's behavior in the candy game and the bug game would predict children's tendency of being egalitarian (choose the same amount of harm for self and the partner), altruistic (choosing more harm for self than for the partner) and spiteful (choosing less harm for self than for the partner).

Method

Participants

A total of two hundred and twenty 3-14 year-old (M=8.20, SD=2.51; 95 males) children from three countries were tested. In Samoa, fifty-two 4-13 year-old (M=8.00, SD=2.007.47; 22 males) children from two villages, Fage and Lalomalava were tested. In China, sixty-three 6-13 year-old (M=9.38, SD=2.07; 28 males) children from middle- to upper middle class families living in Shandong province were tested in a summer camp in the city Zibo. In the US, one hundred and five 3-14 year-old (M=7.47, SD=2.42; 41 males) children from middle- to upper middle class families living in the Greater Atlanta area were tested. Participants were recruited through the IRB approved sites (villages, a summer camp, an elementary school and an after-school program) and Emory University Child Study Center database. All children from the three cultures were tested by the same female researcher. In Samoa, a female Samoan translator was present to translate after each sentence. The testing scripts were translated and back-translated from English to Samoan by a bilingual Samoan translator.

Materials

  The candy game: Two opened 8 ½ in x 11 in notebooks were laid flat in front of the

participant as two placeholders for "choices." The participant was told to imagine an anonymous

partner sat across him. The researcher, who sat by the participant's side, put different numbers of

"rewards" on the participant's side and the partner's side during each trial. The rewards used in

Samoa were "Ringos", a cheese flavored snack. The rewards used in China were assorted flavor

candies. The rewards used in the US were assorted stickers (food was not used as rewards in the

US for health and safety regulations). This game consists of "prosocial," "sharing" and "envy"

conditions (Fehr, Bernhard & Rockenbach, 2008). In the "prosocial" condition, the researcher

asked the participant to choose between two possible allocations of rewards: (1,1), which means

1 reward for him, 1 reward for the partner, or (1,0), which means 1 for him, 0 for the partner

(Figure 1). This treatment measured some basic form of prosociality, because if the subject chose

(1,1), he could deliver a benefit to the partner without cost to himself, thus avoid advantageous

inequity. In the 'envy' condition, the participant could choose between (1,1) or (1,2). The

allocation (1,2) allowed the subject to deliver a bigger benefit to the partner at no cost to himself,

thus create disadvantageous inequity. In the 'sharing treatment', the participant could choose

between (1,1) and (2,0). Here, the choice (1,1) suggested altruistic behavior, since the participant

had to sacrifice his own benefit in order to deliver a benefit to the partner, thus it unambiguously

indicated other-regarding preferences.

  The bug game: The experimental protocol was the same as the candy game, except

plastic bugs were used as the objects to be divided. In the "prosocial" counterpart, the participant

could choose between (1,1) and (1,0). Here, the participant could alleviate the partner's suffering

without extra cost to himself by choosing (1,0). In the "envy" counterpart, if the participant

chose (1,1), he could avoid advantageous inequality. If he chose (1,2), he could be unambiguously antisocial by delivering harm to the partner while the harm could be avoided. In the "sharing" counterpart, he had the choice to double the harm to himself thus protect the partner from harm. The choice of (1,1) could be motivated by equality or self-interest, and (2,0) is motivated unambiguously by altruism.

The rubber band game*:* Inspired by the adult study by Crockett, Kurth-Nelson, Siegel, Dayan and Dolan (2014), this game measures how children perceive the suffering of others in relation to their own suffering. In the "self" condition, the researcher placed 5 rubber bands, from the thinnest to the thickest, on the participant's arm. The participant was asked to choose different levels of slap delivered by stretching a rubber band. The participant was told that the thicker the rubber band, the more painful it would feel if slapped, but by choosing a more painful slap, he could get more "rewards" (e.g., by choosing the thinnest rubber band he could get 1 reward, the second thinnest can get 2 rewards...etc.). The "rewards" used in this game were the same as the "rewards" used in the candy game. In the "other" condition, the researcher placed five rubber bands on the participant's arm, and the researcher held a skin-colored tube with five rubber bands identical to the rubber bands on the participant's arm. The tube was placed next to the participant's arm. The participant was instructed to imagine that the tube was the arm of an anonymous partner, and the participant could decide which rubber band to slap on the partner's arm. The thicker the rubber band chosen for the partner, the more "rewards" the participant could get.

Procedure

The candy game. The researcher showed "rewards" to the participant and said: "Here I have some Ringos/candies/stickers. Now you will have the chance to distribute some of those

between yourself and another kid in your class. He couldn't come here to play with us right now, but we will give him his Ringos/candies/stickers later. I will put the Ringos/candies/stickers you get from the game near you (point at a space on the table near the participant), and the Ringos /candies/stickers he gets here (point at a space on the opposite side of the participant). You will have two options to choose from (point at two opened notebooks). You can only choose one of the two. Anything that I put on the sides near you will be yours; anything I put near him will be the other kid's. Do you understand?"

Then the researcher presented each one of the conditions in randomized orders. Here the prosocial condition was used as an example.

The researcher said: "So here, you can get 1 Ringo/candy/sticker (put 1 "reward" at one of the pages near the participant), the other kid can get 1 Ringo/candy/sticker (put 1 "reward" at the other page of the same notebook). Over here, you can get 1 Ringo/candy/sticker (put 1 "reward" at the other page near the participant), the other kid won't get any Ringos/candies/stickers. So here (point at one notebook), how many Ringos/candies/stickers would you get? How many Ringos/candies/stickers would the other kid get? Here (point at another notebook), how many Ringos/candies/stickers would you get? How many Ringos/candies/stickers would the other kid get?" After the participant was able to get all the questions right, researcher asked the participant: "Ok, so which option do you want to choose?"

The bug game. The participant was presented with plastic bugs, and was told a story by the researcher: "Those are some bugs. They are very nasty and they can bite people. If they bite you, it will hurt very much (pretend to be bitten by a bug and act hurt). All the bug bites hurt equally. Imagine those bugs come to your classroom, and everyone in your class has to get bitten

by those bugs. You can decide how many bugs will bite you, and how many bugs will bite another kid in your class. Here are two options you can choose from." Then the researcher presented each one of the conditions in randomized orders. Here the prosocial treatment counterpart was used as an example.

Researcher said: "So in this option, you will be bitten by 1 bug (put 1 bug at one of the pages near the participant), the other kid will be bitten by 1 bug (put 1 bug at the other page of the same notebook). In the second option, you will get bitten by 1 bug (put 1 bug at the other page near the participant), the other kid won't get bitten by bug. In those two options, which option do you want to choose?"

Every time when presenting a different condition, the researcher alternated the sides of each option. The order of the candy game and the bug game, and the order of the three conditions in each game were counterbalanced for each participant. An understanding check ("So here, how many Ringos/candies/stickers would you get? How many Ringos/candies/stickers would the other kid get?") was used only in the first game.

The rubber band game. The researcher said to the participant: "Here I have a game that can let you win more Ringos/candies/stickers; do you want to play the game with me?" After the participant agreed to play, the researcher placed 5 rubber bands on one of the participant's arm. In the "self" condition, the researcher stretched and held the thinnest rubber band and said: "If I pull this rubber band and let it go, it will hit you and it will hurt a little bit. But if you let me do that, I will give you 1 Ringo/candy/sticker." Then the researcher stretched and held the second thinnest rubber band and said: "If I pull this rubber band and let it go, it will hurt more than the first one. But if you let me do that, I will give you 2 Ringos/candies/stickers." The researcher

repeated the process for all 5 rubber bands. After the instruction, the researcher asked the participant to check the participant's understanding of the instruction: "If I stretch this rubber band (randomly point at one rubber band), who will get hurt? Who will get Ringos/candies/stickers? How many Ringos/candies/stickers will you get? Which of those two rubber bands (randomly point at two rubber bands) will hurt more?" After the participant answered each question correctly, the researcher asked: "Which rubber band do you want me to stretch on your arm?" In the "other" condition, the researcher gave the same instruction using rubber bands on the tube instead of the participant's arm. The difference was that for each rubber band stretched on the "partner's arm," the "rewards" were given to the participant instead of the "partner."

The participant got one chance each for the "self" and "other" conditions. Understanding check was only used after the first condition. The order of the two conditions was counterbalanced for each participant. The researcher in the game delivered no actual rubber band slap to the participant.

Coding

Responses of each participant were coded on a paper at the same time the games were conducted. In Samoa, a combination of video recording and a second coder were used for reliability. In China, a second coder was present with the researcher. The two coding sheets were compared, and in situations of coder discrepancy the data were deleted. In the US, each testing session was video recorded and 20% of the videos were coded by a second coder who did not know the study hypotheses. Then we compared the second coding to the original coding, and rewatched relevant videos in cases of coder discrepancy to resolve the controversial items.

In the original study of the candy game, Fehr, Bernhard and Rockenbach (2008) categorized participants into six behavioral types according to their choices in the "prosocial," "envy" and "sharing" conditions: strongly egalitarian, weakly egalitarian, strongly generous, weakly generous, spiteful and ambiguous. In this study, we kept the criteria for each behavioral type, but condensed the six behavioral types into 4 types: egalitarian (consists of participants who would fit into either "strongly egalitarian" or "weakly egalitarian"), altruistic (consists of participants who would fit into either "strongly generous" or "weakly generous"), spiteful (consistent with the original categorization) and conflicting interests (consistent with the original categorization of "ambiguous", see Table 1). Egalitarian type indicated that when achieving equity was at no cost to oneself, like in the "prosocial" and "envy" conditions, the participant chose the equal allocation of rewards instead of the unequal allocations. In the "sharing" condition, when achieving equity was costly to oneself, choosing the equal allocation was considered a strong form of inequity aversion. Altruistic type indicated that the participant increased the partner's pay-off when it was at no cost to himself. When increasing the partner's pay-off was costly to the participant, like in the "sharing" condition, choosing the option that benefit the partner (1:1) was considered a strong form of altruism. Spiteful type indicated that the participant constantly chose the option that gave the partner the lowest pay-off possible. Conflicting interests type consisted of all other combinations of choices that were not captured in the three types mentioned above. It indicated that two of the participant's choices were in conflict with each other, thus making the intention of the participant ambiguous to interpret.

In the bug game, the egalitarian type indicated that the participate chose equal allocation of bugs in all three conditions (See Table 2). Notice the criterion here was different than the criteria in the candy game, because here choosing (1:1) in the (1:1) vs (2:0) condition did not

signify a stronger form of egalitarian. Choosing 2:0 conflicted with choosing (1:1) in the (1:1) vs (1:0) condition because if a participant was not willing to take one bug bite for the partner to avoid a bug bite, logically he wouldn't be willing to take two bug bites for the partner to avoid bug bite. The rest of the types had the same meaning as they did in the candy game, although the choices might be different due to the change of stimuli.

We coded age as both a continuous variable and a categorical variable. When treating age as a categorical variable, we split children into two age groups: one group consisted of children who were 8 years old and younger, one group consisted of children who were over 8 years old. Research has shown that before 8 years of age, children endorse the norm of fairness, but will not act in accordance to the fairness norm until around 8 years old (Smith, Blake & Harris, 2013).

Results

In this section, we present the results of each game as they were separately analyzed. Then, according to our hypotheses, we examined the relation in behavioral type between the candy game and the bug game at the individual level, as well as investigated whether the behavioral types in the two sharing games (the candy game and the bug game) predicted children's choices in the rubber band game.

The Candy Game

We conducted a log-linear analysis to determine the best model to account for our data. Log-linear analysis is a statistical technique used to examine the relationship between more than two categorical variables. It could be understood as an enhanced version of a Pearson's chi-square test. Two major uses of the log-linear analysis are hypothesis testing and model building. In both uses, combinations of all inputting variables are tested to find the most parsimonious (i.e.,

least complex) model that best accounts for the variance in the observed frequencies (Howell, 2009). The result indicated that, among the 4 inputting variables: Gender, Culture, Age (as a categorical variable) and Behavioral Type, the best model was a three-way interaction between Age, Culture and Behavioral type, Partial Associations X^2 (6, N=210)[1]=21.922, p=.001. Two figures were produced based on the result (See Figure 2). The first figure (Figure 2.a) shows the distribution of behavioral type in each culture for the younger children (8 years old and under). According to the figure, American children showed an earlier development of inequity aversion. 50% American children in the younger age group displayed egalitarianism when dividing "rewards", whereas 37.5% Chinese children and 18.5% Samoan children in that age group displayed egalitarianism. Younger Samoan children showed heightened altruism (40.7%) in comparison to Chinese children (29.2%) and American children (18.6%). The significant effect of culture on behavioral type was supported by a chi-square analysis, X^2 (6, N=121) =17.973, p=.006. Further, Cramer's V effect size value ($V = .273$) suggested a small to medium effect of culture on behavioral type among younger children.

Figure 2.b describes the distribution of behavioral type in each culture for the older children (over 8 years old). In this figure, over half of the children from all cultures were able to divide "rewards" based on the egalitarian principle, with American children being the most egalitarian among all cultures (64.5%). Surprisingly, we saw a sharp drop in the altruism type in Samoan children (from 40.7% to 4.3%) when the percentage of the altruism type raised in the other two cultures (China: 29.2% to 40.0%; the US: 18.6% to 32.3%). Importantly, the conflicting interests type was not present in older Chinese and American children, but 26.1% of

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[1] The sample size included in this analysis and subsequent analyses is different than the total number of participants tested. This is because some children did not complete all three games, or they did not complete all conditions in a particular game. Under such circumstance, the participant's data for the game(s) they did not complete were deleted in relevant analyses.

older Samoan children fell into this category. A chi-square analysis (Culture X Behavioral Type) revealed significant relation between culture and behavioral type, X^2 (6, N=89) =27.341, p<.001. Further, Cramer's V effect size value (*V* = .392) suggested a medium to large effect of culture on behavioral type among older children.

The Bug Game

A log-linear analysis indicated the best model to be Age X Behavioral Type (Partial Associations X^2 (3, N=212) =26.483, p<.001), Culture X Behavioral Type (Partial Associations X^2 (6, N=212) =14.424, p=.025) and Age X Culture (Partial Associations X^2 (2, N=212) =10.638, p=.025). Because Age and Culture are both demographic variables, and they have been reported in the Method section, no further analysis was needed for this interaction. According to this result, we separately examined the effect of age and the effect of culture on behavioral type in the bug game.

Figure 3.a shows the distribution of behavioral type in each age group. In this graph, the behavioral types of the younger children were relatively evenly distributed, with egalitarian (33.9%) being the most common type. But in the older children group, over half of the children (56.0%) were altruistic, meaning they accepted more harms for themselves and gave less harm to the partner. A chi-square analysis indicated a significant relation between age and behavioral type, X^2 (3, N=212) =30.138, p<.001. Further, Cramer's V effect size value (*V* = .377) suggested a medium to large effect of age on behavioral type in the bug game.

Figure 3.b shows the distribution of behavioral type in each culture. The most prominent feature in this graph was the heightened altruism displayed by the majority of the Chinese children (53.3%). A large portion of Samoan children (37.3%) were categorized as the

conflicting interests type, whereas only 13.3% Chinese children and 18.8% American children fell into that type. A chi-square test yielded significant relation between the two variables, X^2 (6, N=212) =20.180, p=.003). Further, Cramer's V effect size value (V = .218) suggested a small to medium effect of culture on behavioral type in the bug game.

Consistency between Candy and Bug Game:

We hypothesized that the majority of the children from all cultures would be categorized under the same behavioral type in the candy game and the bug game, e.g. an egalitarian child in the candy game would also be egalitarian in the bug game. To test this hypothesis, we analyzed children whose behavioral types were constant across games and those who were not. A binomial test yielded no significant difference between the number of children who changed their types from one game to another (N=105) and those who did not (N=100, p=.78), indicating that half of the children across all cultures displayed consistency of behavior across games. However, a chi-square analysis revealed a significant correlation between children's behavior type in the candy game and in the bug game, X^2 (9, N=205) =92.464, p<.001. Cramer's V effect size value (V = .388) suggested a medium to large effect of the correlation between behavioral type in the two games. This result showed that children were acting considerably consistent in the candy game and the bug game. To take a closer look at the characteristics of children whose behavioral types were consistent, we performed a log-linear analysis to select the best fitting model among variables Gender, Culture, Age and Behavioral Type. The model produced was Culture X Behavioral Type (Partial Associations: X^2 (6, N=100) =40.041, p<.001)

Figure 4 shows the distribution of consistent behavioral type in each culture. In the graph we can clearly see that American children were the most egalitarian (56.3%) across the two games, while Chinese children were the most altruistic (58.1%) and Samoan children displayed

the most conflicting interests (47.6%). A chi-square analysis revealed a significant relation between culture and consistent behavioral type, X^2 (6, N=100) =40.041, p<.001. Further, Cramer's V effect size value (*V* = .447) suggested a medium to large effect of culture on consistent behavioral types across cultures.

Variability from the Candy Game to the Bug Game:

We hypothesized that for those children whose behavioral type changed from the candy game to the bug game, they would be more altruistic in the bug game as compared to the candy game. To examine this hypothesis, we categorized the changes from the candy game to the bug game into 4 categories: from non-egalitarian (altruistic, spiteful, conflicting interests) to egalitarian, from non-altruistic (egalitarian, spiteful, conflicting interests) to altruistic, from non-spiteful (egalitarian, altruistic, conflicting interests) to spiteful and from non-conflicting interests (egalitarian, altruistic, spiteful) to conflicting interests. A log-linear analysis was performed to select the best fitting model among variables Culture, Age, Gender and Behavioral Type Variation. The model produced was Age X Behavioral Type Variation (Partial Associations: X^2 (3, N=105) =30.642, p<.001) and Age X Culture (Partial Associations: X^2 (2, N=105) =7.690, p=.021. Because both Age and Culture are demographic variables, no further analysis was conducted on this interaction.

Figure 5 shows the distribution of behavioral type variation in each age group. We can observe from this graph that, for those children whose behavioral type changed from the candy game to the bug game, the younger children tend to have more conflicting interests (40.4%) and act spitefully (28.1%) in the bug game as compared to the candy game, whereas the older children overwhelmingly became more altruistic (64.6%) in the bug game. A chi-square analysis yielded a significant relation between Age and Behavioral Type Variation, X^2 (3, N=105)

=28.659, p<.001. Further, Cramer's V effect size value (*V* = .522) suggested a large effect of age on behavioral type variation.

Summary and Discussion of the Candy and Bug Game Results

For the candy game and the bug game, we expected that American children would be the most egalitarian, Chinese children would be the most altruistic, and Samoan children would be the least egalitarian and display high altruism. We also hypothesized that older children across all cultures would display more egalitarianism as compared to younger children. Our results partially confirmed our hypotheses. We found that American children displayed both a higher and an earlier egalitarian tendency as compared to children from other cultures. Chinese children showed heightened altruism in both games, especially in the bug game. However, contrary to our expectation, Samoan children had the most conflicting interests in their motivations in the two games. We also observed that Samoan children displayed a very early development of altruism in the candy game, but this tendency dropped after age 8. The potential explanation is the ambivalence and duality in Samoan culture, as documented by anthropologists (for further discussion, please see General Discussion). By age 8, most of the children tested fell into the egalitarian behavioral type. However, in the bug game, we found a strong age effect in altruism.

We also predicted that, in general, most children would display behavioral consistency between the candy game and the bug game, e.g. a child who was egalitarian in the candy game would be egalitarian in the bug game. For those children who changed their behavioral type from the candy game to the bug game, we predicted that most children would change towards the direction of altruism. Overall, results yielded a significant correlation between the behavioral type in the candy game and the bug game, although the number of children who behaved consistently did not differ from the number of children who changed their behavioral type. The

results partially supported the second hypothesis. We found that only older children who changed behavioral type from the candy game to the bug game displayed more altruism in the bug game.

The Rubber Band Game

To measure the number of rubber band hits chosen for self and other by children of different ages and cultures, we conducted a 2 (Subject Conditions: Self vs Other) X 3 (Cultures) X 2 (Age Groups) mixed design analysis of variance (ANOVA). The result yielded a significant three way interaction: Culture x Age x Conditions, $F(2, 210) = 4.413$, $p = .013$, $\eta p^2 = .4$. As Figure 4 illustrates, Bonferroni pairwise comparison indicated that older Chinese children chose significantly less rubber bands for other than for self, displaying the "hyperaltruistic" tendency $(F(1, 210) = 31.055$, $p < .001$, $\eta p^2 = .129)$. No significant differences were found among younger children (Samoan: $F(1, 210) = .662$, $p = .417$, $\eta p^2 = .003$; Chinese: $F(1, 210) = .011$, $p = .916$, $\eta p^2 < .001$; American: $F(1, 210) = 2.868$, $p = .092$, $\eta p^2 = .013$) and older children in Samoa $(F(1, 210) = .049$, $p = .826$, $\eta p^2 < .001)$ and the US $(F(1, 210) = .314$, $p = .576$, $\eta p^2 = .001)$.

Correlation between the Candy Game and the Rubber Band Game, and between the Bug Game and the Rubber Band Game

Linear regressions were conducted to investigate the correlation between the behavioral types in the two sharing games (the candy game and the bug game) and the difference in hits in the rubber band game. Results yielded no significant relation between behavioral types in the candy game and the difference of the number of rubber band hits chosen for self and others, $F(1,200=0.628,p=.43)$, with an R^2 of .003. The results also showed no significant relation between behavioral types in the bug game and the difference in pain distribution between self

and other in the rubber band game, F(1,199=0.084, p=.77), with an R^2 of .004. Based on the results, the behavioral type of the participant in either the candy game or the bug game does not predict his tendency in the rubber band game, whether it's altruistic (more rubber band hits for self than for other), egalitarian (same rubber band hits for self and other) or selfish (less rubber band hits for self than for other).

Summary and Discussion of the Rubber Band Game Results

We hypothesized that younger children across cultures would choose less harm for self than for the partner. Older children in China would be altruistic by choosing to inflict more harm to themselves and less harm to the partner in exchange for rewards. Older children in the US would be egalitarian by choosing to inflict a similar amount of harm to themselves and to the partner. Older Samoan children would inflict more harm to themselves and less harm to others, because of the expected lower level of egalitarianism and higher level of altruism. These hypotheses were partially supported by our results. We found that for the younger age group, children of all 3 cultures did not show a difference in distributing pain between the self and the partner. Likewise, for the older Samoan and American groups, no difference in pain distribution was found between the self and other. However, older Chinese children inflicted significantly less pain to the other than they did to themselves, demonstrating that they were more concerned about the other's pain, more willing to give up self benefit in order to reduce the partner's pain.

We also hypothesized behavioral consistency between the first two games (the candy game and the bug game) and the rubber band game. For example, a child who was egalitarian in the candy game (or the bug game) was expected to choose the same number of rubber band hits for himself and for the partner. This hypothesis was not supported by the results. We found no

significant correlation between the behavioral types in the first two games and the difference in pain distribution between self and other in the rubber band game.

General Discussion

The present study investigated inequity aversion for positive and negative outcomes, altruistic tendency in the concern for the suffering of others, and the possible correlations between the two constructs. In our discussion of the results, we focus on how two factors, culture and age, influence children's emerging egalitarian and altruistic behavior, and how to interpret the issue of within subject correlation between the three games in the current study. Then we discuss the limitations of the study, as well as how this study contributes to our broader understanding of children's moral reasoning across the 3 cultures.

How do children from different cultures differ in their egalitarian and altruistic behaviors?

We predicted that, in the candy game and the bug game, American children would behave the most egalitarian and Chinese and Samoan children would display heightened altruism. These hypotheses were partially supported by the results. Data showed that American children did exhibit both an earlier (in the candy game) and a stronger tendency for egalitarianism. This could be explained by two theories proposed earlier in this paper. First, in the US, justice is preferred as the common manner in resolving conflicts and in self-identification (Conner, 2009). The ethic of justice largely focuses on rights, fairness and rules, thus encouraging equality in all aspects of life (Gilligan, 1982/1993). Children from the US adopt such morality and act in accordance to the principle of fairness at an earlier age and to a greater extent than children from other cultures. Second, the US is a highly urbanized country with people's lifestyle largely dependent on the market. According to the market integration theory proposed by Henrich

(2010), people from the US are highly egalitarian because a market economy, i.e. the frequent one-time transactions between strangers, requires mutual trust and compliance with the equality norm.

Consistent with our hypothesis, Chinese children showed elevated altruism in all three games. China has long been considered a torchbearer for collectivist culture. In comparison to individualistic culture that focuses on the possession and achievement of the self, collectivist culture values social harmony and relationships among community members. This value system might predispose children to a more altruistic way of sharing. The ethic of care, practiced by most Chinese parents and teachers, also plays an important role in shaping children's concern for others. From an early age, Chinese teachers and parents introduce children to stories of famous moral exemplars who sacrificed the interest of themselves in order to benefit others. Examples of such moral exemplars include ancient figures such as Kong Rong, who willingly gave the bigger pear to his brother and took the smaller pear for himself, to modern war heroes such as Huang Jiguang, who body-blocked the enemy's rifle in order for his comrades to escape. Children are implicitly and explicitly encouraged to act like those figures and take pride in sacrificing personal interests for the interests of the group or others. The internalization of such moral valuation might be the reason for the high altruistic tendency observed among Chinese children. An alternative explanation concerns the issue of reputation management prevalent in the face culture. "Face" is an essential concept in understanding Chinese culture. It roughly translates to "esteem" or "reputation" in English. It has been theorized that people from a face culture tend to establish their self-worth based on how they are collectively seen by other community members (Seo, Kim, Tam & Rozin, 2016). This leads to a greater possibility for Chinese children to act

altruistic in front of an authority figure (the researcher) for the sake of self-presentation and avoiding "losing face".

Although Chinese children tested in this study were from an urban city, they did not seem to act as egalitarian as American children did. The strong cultural norm in Chinese society might override market integration as a factor. This leads to the question of how should we categorize and understand culture. It is popular in the literature of psychology to fit cultures into dichotomies: collectivist culture and individualistic culture, horizontal culture and vertical culture, high market integration culture and low market integration culture, etc., and ascribe a certain set of characteristics to each category as the "prototype" of this culture. However, this way of understanding cultures seems to be too simplistic and overlooks the various factors contributing to the culture as a whole. This paper demonstrated that one cultural theory often times is not sufficient to explain differences among cultures, thus it is imperative to consider different models and aspects of culture to discover the meanings behind the observations.

Contrary to our expectation, Samoan children did not display heightened altruism in the three games. Instead, a large percentage of them fell into the conflicting interests category in the candy and the bug game, as well as when comparing consistency across the two games. This means that Samoan children frequently made choices that were in contradiction to each other. Another observation of the ambiguity in Samoan children was the drastic drop in altruistic behavior from the younger age group to the older age group in the candy game. This phenomenon contradicted the current literature on altruism, stating that altruism will increase as a function of age (Benenson, Pascoe & Radmore, 2007; Harbaugh, Krause, and Liday, 2003). To understand the ambiguity, we must first look at the structure of Samoan society. Samoa has "strong traditions of collective living organized around a highly hierarchical chief ("Mataï")

system that is typical of Polynesian culture" (Robbins & Rochat, 2011). However, under this unquestioned sanctity and highly structured political order, tensions and contradictory models are built right into the chiefly institutions themselves (Shore, 1998). In his book "Culture in Mind: Cognition, Culture, and the Problem of Meaning" (1998), Shore discussed several examples of such ambivalence. One of them is the contradiction between the value enforced by the community and the value held by the individual. He described a Samoan chief's son whose father was killed by another village chief. To minimize the threat to village peace and uphold the traditional Samoan values of harmony, patience and forgiveness, local chiefs and a pastor counseled forbearance to the young man in the spirit of Christian love. Surprisingly, in a private conversation, the same pastor told the son in hushed yet aggressive tones: "If you don't avenge the death of your father, you are not your father's son" (Shore, 1998, p288). This example illustrated the dissociation of values in Samoan society:

> There is an explicit set of Samoan values emphasizing cooperation, harmony, deference to authority, and the subordination of antisocial impulses to the needs of the group. Yet there is another set of Samoan values emphasizing personal heroism, boldness, competitiveness, fierce loyalty to one's own group at the expense of social harmony, and personal touchiness at perceived attacks on personal or family honor. (Shore, 1999, p. 289)

This ambivalence was also noted by many other anthropologists (Freeman, 1983; Mead, 1965; Keesing & Keesing, 1956; Lemert, 1972). Lemert characterized Samoan personality as "a deep substratum of aggression…which readily comes to the surface with intoxication" (1972, p230) Surprisingly, this kind of alcohol related aggression is permitted, even encouraged, by the chiefs as "a kind of release from the normal stresses of being under the authority of their titled

elders most of the time" (as cited in Shore, 1998, p300). Based on this anthropological research on Samoan culture, it is understandable that Samoan children displayed a high level of ambiguity in moral decision making.

How do children's egalitarian and altruistic behaviors change as a function of age?

We hypothesized that children from all cultures would show an increase in egalitarian and altruistic behaviors as a function of age. This prediction was supported by the results of the current study. In the candy game, we observed a strong development in egalitarianism from the younger group to the older group, regardless of culture. This finding is consistent with the literature that inequity aversion develops strongly between age 3-8, and by age 8 most children become egalitarian (Fehr, Bernhard and Rockenbach, 2008).

The results of the bug game showed that older children were more altruistic when dividing harm as compared to the younger children. Although there seemed to be a drop in egalitarianism in the older children in the bug game, it was largely due to the large percentage of altruism type making the percentage of other types shrink. This result also confirmed the findings of the literature that altruism will increase with age (Benenson, Pascoe & Radmore, 2007; Harbaugh, Krause, and Liday, 2003).

However, we did not observe this leap in the development of altruism in the candy game. In the candy game, the overwhelming developmental trend was the increase in egalitarianism. This difference signifies that the older children used a different mental process when making decisions about harm than when making decisions about rewards. At an individual level, we also observed this relatively heightened altruistic tendency in the bug game among older children. Except those who behaved consistently across games, most older children who were not altruistic

in the candy game became altruistic in the bug game. These results supported the finding of Crockett et. al (2014) that people are more concerned about others' pain than their own, and provided new evidence that the "hyperaltruistic" valuation of other's pain starts to develop around 8 years of age.

One of the possible reason for the "hyperaltruism" is the concern for empathy. Empathic concern is defined as the other-oriented, tender state experienced when seeing the distress of others that promotes altruistic behaviors aimed at relieving the distress (de Waal, 2009; Batson, 2010). However, this perspective predicts that people will value others' pain as equivalent, to the most, to their own pain, provided that they empathize with the other person (Crockett et. al, 2014). However, this theory cannot explain the observation that older children chose more bug bites for themselves and less bug bites for the partner. The alternative reason, proposed by Crockett et. al (2014) and promoted in this paper, is the reluctance of causing bad outcomes in others. In *The Theory of Moral Sentiments*, Adam Smith (1759) wrote: "For one man ... unjustly to promote his own advantage by the loss or disadvantage of another, is more contrary to nature, than death, than poverty, than pain, than all the misfortunes which can affect him." Most societies proscribe harming others in exchange for personal benefit. Like other social cognitive processes, the internalization of such a moral norm is learned through socialization. This finding shows that by 8 years old, children start to incorporate such a moral norm into behavior, and become autonomous moral agents instead of free-riders or strict conformists.

Within Subject Correlation: What Does It Mean?

We predicted that most children would display consistency in behavioral type between the candy game and the bug game. This hypothesis was not supported, as binomial tests showed that there were equal numbers of children who were consistent and who changed from the candy

game to the bug game. However, we found a significant correlation between the behavioral type in the candy game and in the bug game, supporting the idea that both games tap into analogous processing. The correlation supports the validity of the behavioral type categorization used for both games.

However, the result shows that neither the candy game nor the bug game was correlated with the rubber band game. This is contrary to our expectation, as we predicted that children's behavioral type would be linked to their choices in the rubber band game, e.g. a child who acted egalitarian in the candy game (or the bug game) would choose a higher number of rubber bands for himself than for the partner. This inconsistency between different decision making games at an individual level has been documented by a study by Blanco, Engelmann & Normann (2010). In that study, the researchers let subjects play different games (an ultimatum game, a modified dictator game, a sequential-move prisoner's dilemma and a public-good game) measuring inequity aversion, and they found that although the results between games were correlated at an aggregated level, they differed significantly at an individual level, meaning the subjects used different strategies for different games, even though the games were supposed to measure the same construct.

This individual-level inconsistency can be attributed to three potential reasons. A first reason is a notion of responsibility (Blanco, Engelmann & Normann 2010). Different games granted the subject different responsibilities for the gain or harm of others, and this difference in the sense of responsibility might cause the motive for behaviors to change. A second reason is the perceived realness of the games. In the bug game we used plastic bugs as a representation of harm and pain. However, even young children understood that the bugs were not real and cannot cause real harm. Under this circumstance, they might behave more altruistically, taking more bug bites for

themselves than giving them to others because there were no real consequences in doing so. However, in the rubber band game, actual rubber bands were placed on the children's arm and they witnessed and experienced the researcher stretching the rubber band on their arms. Although no actual rubber band slap was delivered during the game, the perceived realness and elicited fear were different for the two games. This difference in perceived realness might explain the inconsistency between the behavioral type in the bug game and the choices in the rubber band game. Finally, a third reason is that, social psychology research (e.g. Ross and Nisbett, 1991) suggests that the stability of preferences is not granted: "There seems to be low predictability of how an individual will behave in a given situation from past behavior, and the specifics of the situation are important for individual decisions." (as cited in Blanco, Engelmann & Normann, 2010) Based on the reasons proposed, there are different explanations for the changes in behavior in a participant, and further research is needed to determine the cause for low predictive power for different games at an individual level.

Limitations and Future Directions

While every attempt was made to create the exact same experimental environment for participants, there are still some limitations due to the nature of cross-cultural research. For example, the presence of the researcher might have different effects in different cultures. The researcher (female of Chinese origin) could likely be perceived as an out-grouper in Samoa and potentially the US, and an in-grouper in China. Although children were explicitly told that they were playing games with an anonymous partner from their class, the presence of the researcher might implicitly give them the impression that they were playing with the researcher. Studies show that children were more likely to be egalitarian and altruistic with in-groups than with out-groups (Fehr, Bernhard & Rockenbach, 2008). The translation process in testing Samoan

children also prolonged the games. Children's attention span is transient and tends to decrease with the length of the task. Testing done in Samoa with translation could take up to 20 minutes, risking the possibility of decreased attention on the games.

Further analysis could be performed to investigate time as a factor in children's decision making when the outcome is performed in self versus others. Research has found that people take more time to make decisions when they involves the wellbeing of others than they do for themselves (Crockett et. al, 2014). Future research will also benefit from using the current games to test adult populations within each culture. Literature shows that children's sharing behavior tends to resemble the behaviors of the adults in the same community (House et. al, 2013), and other-regarding preferences are still developing in adolescence and early adulthood .

The current research contributes to the literature mainly in the following three ways: First, this is the first study to date that has examined sharing and inequity aversion of negative outcomes. It offers a new perspective of understanding fairness that involves empathy and moral aversion for harming others. Second, this study is the first to explore the phenomenon of "hyperaltruism" from a developmental and cross-cultural perspective. Third, the study demonstrats the importance of understanding culture from multiple dimensions instead of a simple, clear-cut categorization.

Conclusion

Empirical evidence shows that children start to display emerging signs of other-regarding preferences as early as 15 months. But the development of such social cognitive processes is largely dependent on culture and social interactions.

It has long been understood that the development of other-regarding preferences, such as altruism and inequity aversion, is largely dependent on age and culture. However, little do we know whether such other-concerning thought processes will be present when the decisions are made based on the division of harm instead of rewards. This also leads to the question of how do children evaluate the gain and suffering of others in relation to their own. In this paper, we presented a cross-cultural developmental study consisting of three games. We found that age and culture jointly influenced children's behavior when sharing rewards, as reflected in the candy game, and separately influenced children's behavior when sharing harm, as reflected in the bug game. Considering age as a factor, there was a developmental trend of egalitarianism when sharing rewards, and a trend of altruism when sharing harm. Considering culture as a factor, when sharing both rewards and harm, American children were the most egalitarian, Chinese children were the most altruistic, and Samoan children had the most conflicting interests. In the rubber band game where children distribute pain to themselvs and others in exchange for self-benefits, older Chinese children displayed "hyperatruism", meaning they were less willing to inflict pain on others for rewards than they would do to themselves. We also found that although children's behaviors were highly correlated in the candy game and the bug game, the correlation does not exist between the candy game (or the bug game) and the rubber band game. While the three games we address here indicate the age and cultural effects on egalitarianism and altruism in development, much research remains to fully explore the trajectories of these defining human characteristics.

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Table 1. Classification of types based on individual behavior in the Candy Game

The Candy Game	Prosocial: 1:1 vs 1:0	Sharing 1:1 vs 2:0	Envy 1:1 vs 1:2
Egalitarian	1:1	1:1	1:1
	1:1	2:0	1:1
Altruistic	1:1	1:1	1:2
	1:1	2:0	1:2
Spiteful	1:0	2:0	1:1
Conflicting interests	All other	All other	All other

Table 2. Classification of types based on individual behavior in the Bug Game

Bug Game	1:1 vs 1:0	1:1 vs2:0	1:1 vs1:2
Egalitarian	1:1	1:1	1:1
Altruistic	1:0	2:0	1:1
	1:0	1:1	1:1
Spiteful	1:1	1:1	1:2
Conflicting interests	All other	All other	All other

Table 2. Classification of types based on individual behavior in the Bug Game

Figure 1. Game setting for the Candy Game-prosocial treatment

Figure 2.a: The distribution of behavioral types in the candy game in each culture for younger children
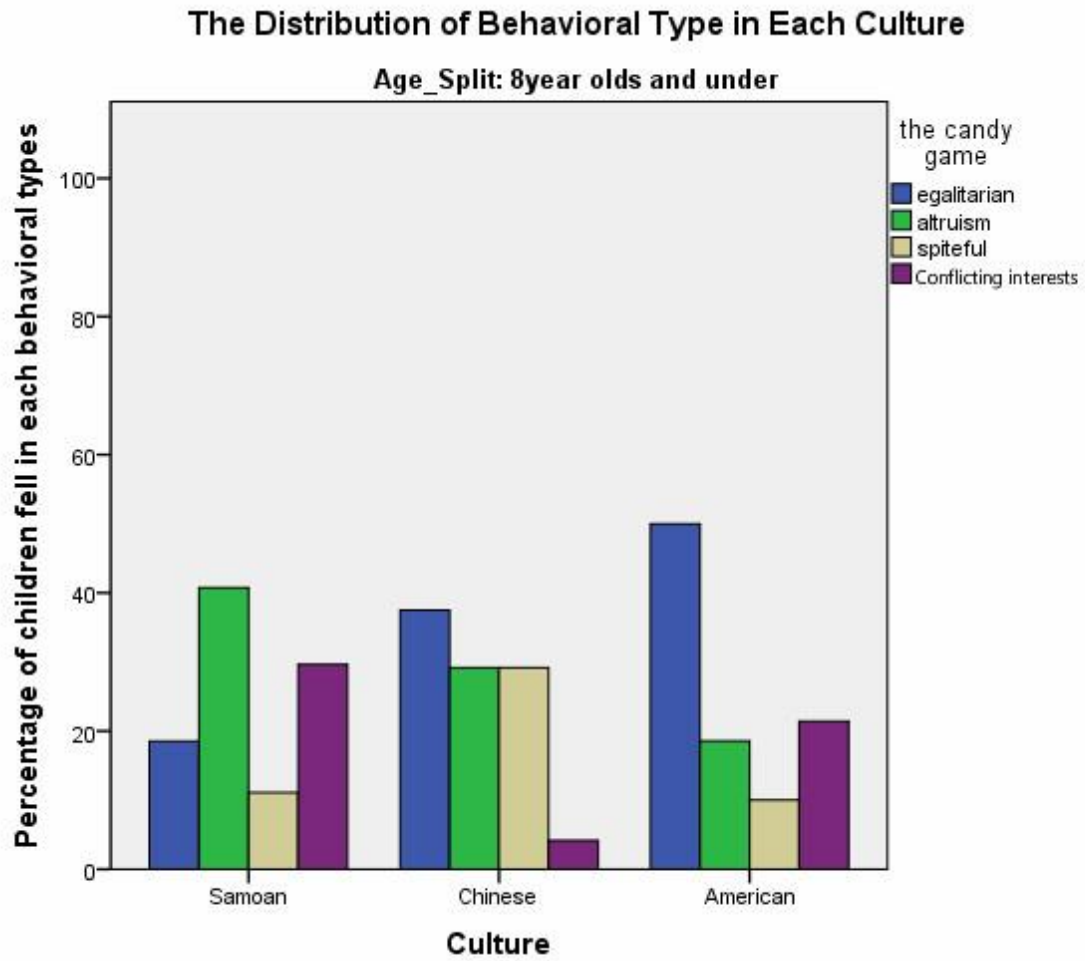
Figure 2.b: The distribution of behavioral types in the candy game in each culture for older children
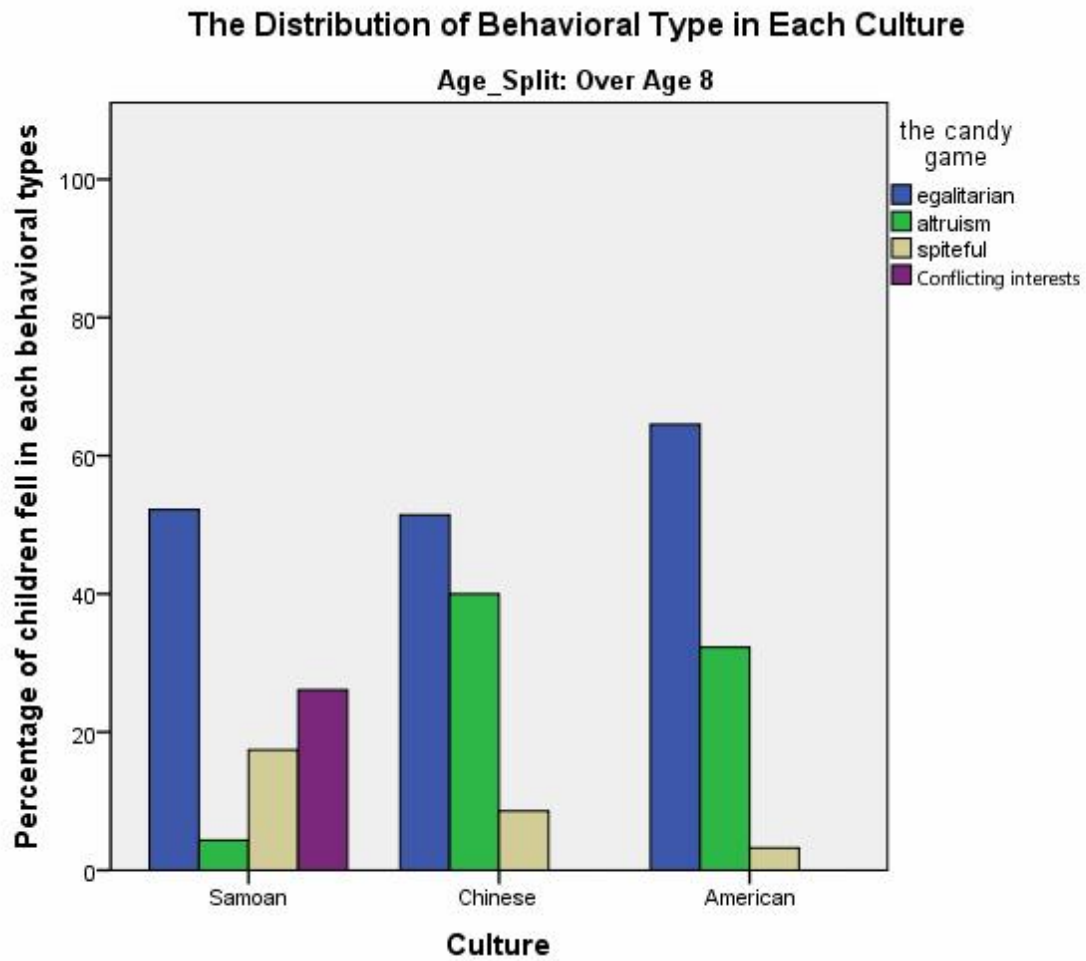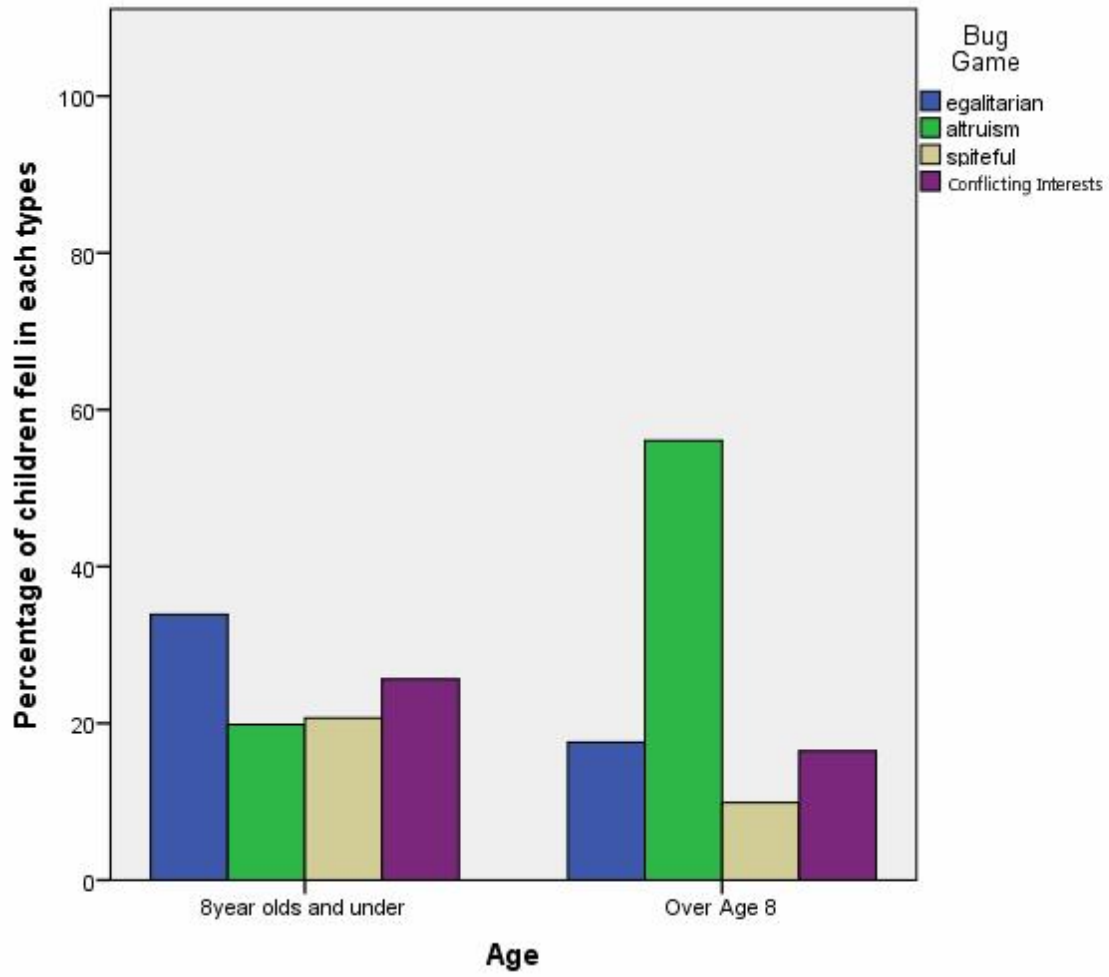

The Distribution of Behavioral Type in Each Culture

Figure 3.a: The distribution of behavioral types in the bug game in each age group

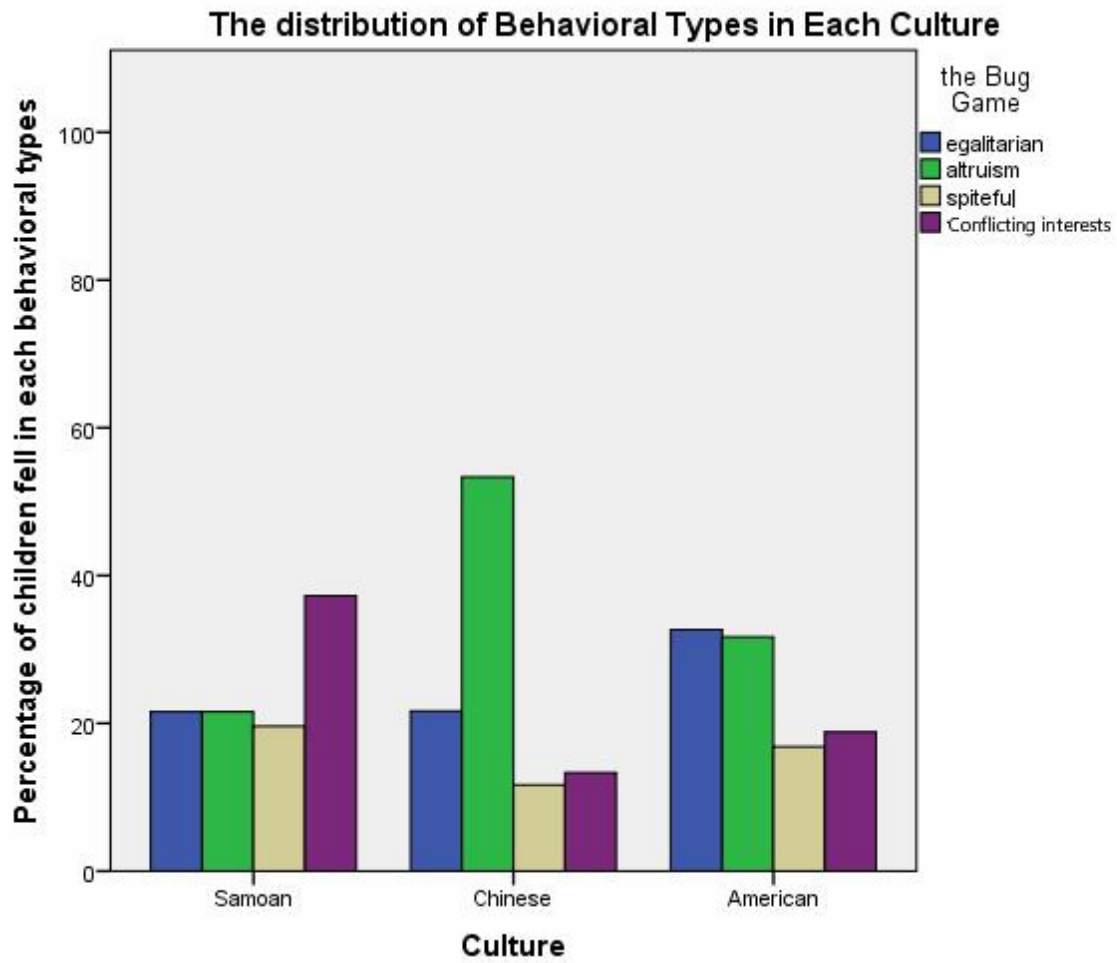Figure 3.b: The distribution of behavioral types in the bug game in each culture

The distribution of Behavioral Types in Each Culture

Figure 4. The distribution of consistent behavioral types in each culture

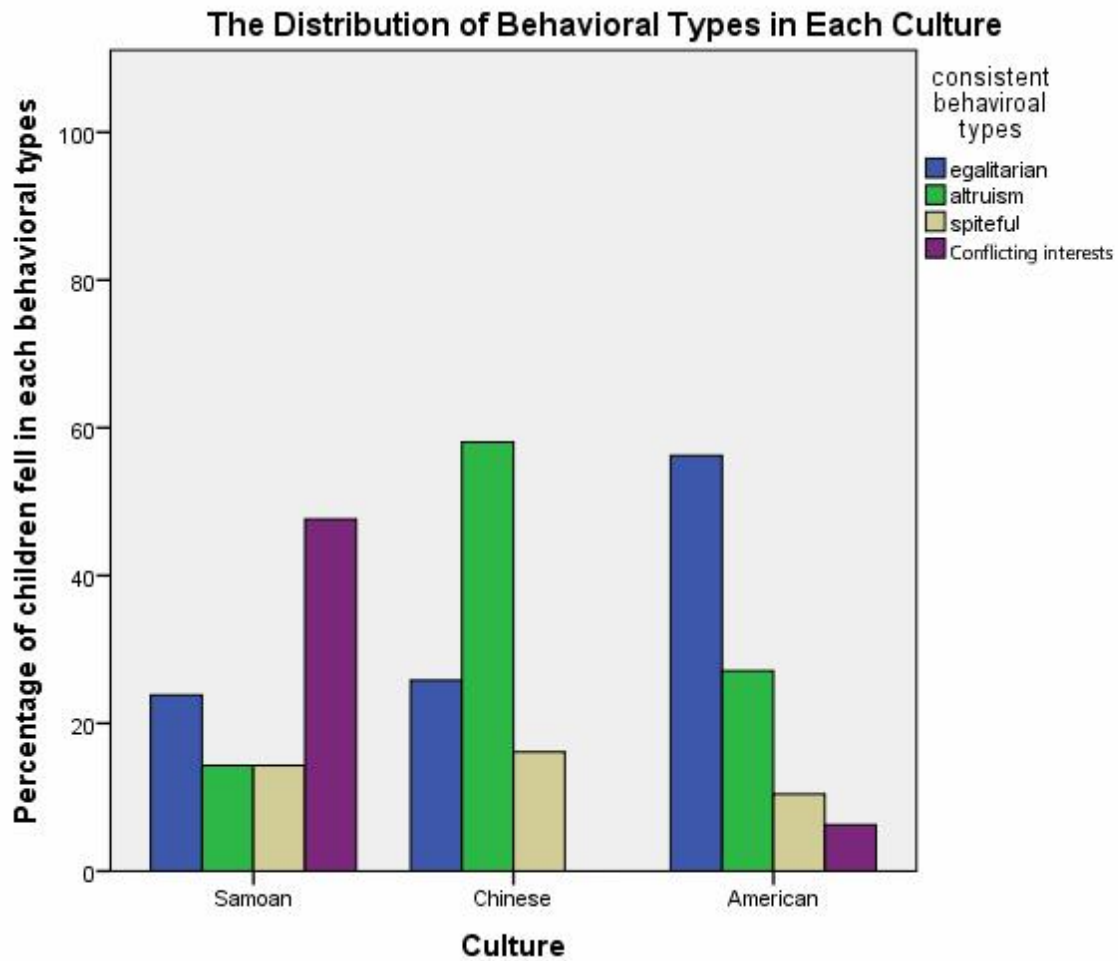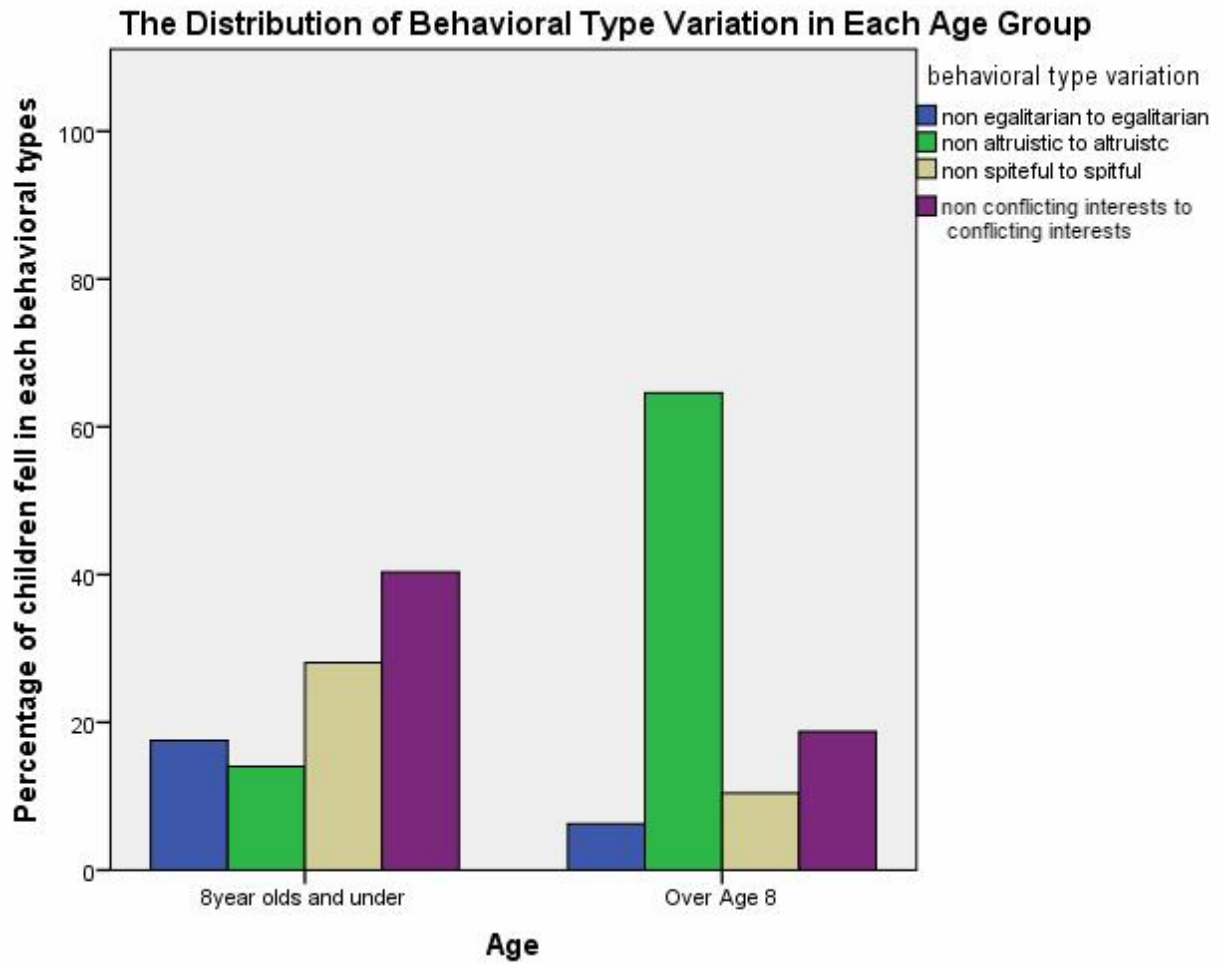The Distribution of Behavioral Types in Each Culture

Figure 5. The distribution of behavioral type variation in each age group

Figure 6. The relation between culture and difference in the number of rubber band chosen for self and other in two age groups

Error bars: +/- 1 SE