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THE DEVELOPMENT OF SOCIO-MORAL EVALUATIONS IN HUMAN INFANTS AND PRESCHOOLERS

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THE DEVELOPMENT OF SOCIO-MORAL EVALUATIONS IN HUMAN INFANTS AND PRESCHOOLERS

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PART ONE: INTRODUCTION

Chapter 1

In my thesis, I will be presenting some empirical findings on the development of socio-moral evaluations in infants and preschoolers, this subject has had a long trajectory in the field of psychology in the last decades. For this reason, it is important that I describe some of the classical theories and recent literature that explains the development of morality. More specifically, I studied next to my collaborators: the emerging capacity of 'the sense of fairness', 'harm', 'prosocial helping behaviors', and the 'logic of merit'. Our research supports a nativist viewpoint where the origins of justice, fairness, and equity are of an innate foundation rather than an acquired one.

In the first part of my thesis, I will give an overview of the literature about my topic. Later, I will conclude this introductory part with the presentation of our empirical findings and finally, a general discussion.

1.1 Moral development

The aim of this first part of my thesis is to address two relevant issues to the development of morality. The first issue is more about epistemology (in the constructed-developmental approach, like social domain) than about development, having to do with the conceptualizations of morality as a whole. The issue of conceptualization requires knowing how to illustrate the psychological functioning of humans, in other words, how perspectives on psychological functioning lead to conceptualizations of morality and its acquisition by children. The second issue describes the developmental side (contrasting constructed-developmental approaches with deterministic ones), having to do with how children think about morality, which includes thinking in social terms. In these circumstances, I will reflect what literature reveals about processes of development in the moral domain.

The approach often referred to as social domain approach (as described in Turiel, 2006, Killen & Smetana, 2015), is based on the ways children, adolescents, and adults form distinct and abstract types of thinking in the moral, social-conventional, and personal domains. Research on these domains suggests that morality rests on core judgments about welfare, justice and rights that are considered important and necessary and that people struggle with moral issues in their social lives. Furthermore, in the social domain approach it is suggested that the development of morality happens through children's reciprocal interactions with adults and peers leading to social arrangements and cultural practices that make them aware of injustices and inequalities.

The approach outlined until now about morality and its development diverges with other psychological perceptions suggesting deterministic conceptions of morality and its acquisition based on several factors, including genetics, built-in intuitions, conscience, traits of character or acquired virtues and internalized parental authority and societal values/norms/rules, these nurturing certain ideas, emotions, or intuitions (Killen & Smetana, 2015).

Some theoretical approaches represent an important division in psychological explanations of morality and its development. These important divisions are whether morality is: a) part of the ways people actively deal with right and wrong and good and bad in their social relationships (see Turiel, 2008), or b) determined by psychological mechanisms, such as fixed biological dispositions. Each of these perspectives provides different explanations of processes of moral development. One side of the division explains the development as involving the construction of judgements about right or wrong through children's social experience and interactions. The other, nativist side, sees the basic characters of morality innate instead acquired. In the first case, the interactions drive the moral development and only capacities to acquire morality are innate, i.e., the biology part only involves the cognitive and other capacities to acquire morality, and what morality is determined by the social surroundings. In the latter case, the innate morality manifests itself in the interactions, i.e.,

morality is "programmed", but its manifestation might need triggering: that is, the predisposition for morality becomes moral behavior only when the child is exposed to the kind of situations where morality is needed. Both cases are compatible with the idea that there are stages in moral development, but only the latter predicts high degree of universality in development. Thus, moral development involves both divisions as necessary components, i.e., both the social environment and biology are involved in the developmental process.

The first side of the division on whether the development of morality is based on social experiences and interactions goes back to classical structural developmental theories (Piaget, 1932; Kohlberg, 1981). Both Piaget and Kohlberg (as described in Turiel, 2006) have in common that what is considered the development of moral judgment is dependent from cognitive development and the following steps is an obligatory route that are traced by the laws of development. According to Piaget (1932), the development of the sense of justice is a primary aspect from a transition from a heteronomous morality to an autonomous morality, and is closely linked to experiences with the peer group. Piaget has outlined the development of the understanding of the two classical notions of justice: distributive and retributive. Distributive justice seeks to promote an equitable distribution of common resources, that is, a materially fair society, where there is no room for jealousy or resentment of others' fortunes. Retributive justice promotes the distribution of sanctions and rewards for one's actions: the crime deserves an equivalent penalty and the good deed a corresponding prize. Retributive justice occurs early, has a more individual nature and it takes into account the relationship between sanctions and rewards. The understanding of distributive justice seems to emerge later in development, when the autonomous morality evolves: it has a social nature and is dominated at the beginning by a principle of equality and then equity. Piaget also investigated the notion of expiatory punishment that dominates the stage of moral realism: it is related to the idea that every transgression must follow a severe punishment, which appears as a

natural and necessary consequence of a punitive act and that in any case will be from somewhere, maybe not from the people but from natural facts (immanent justice). Following the cooperation and experience of reciprocal respect, the expiatory character of a sanction is deleted and the repairing aspect or reciprocal obligation prevails. This reciprocity initially a simplistic character gradually becomes more universal. Moreover, Piaget found that explicit moral reasoning, expressed verbally by the child, is a kind of awareness of morality, supported by cognitive abilities that have developed.

Kohlberg (1971, also described in Turiel 2006) extended and completed Piaget's theory, in which he shares a developmental stages, the central consideration of the cognitive processes and the prevailing interest for moral thought and action. The extension consists of an enunciation of stages finishing at an adult age and a precise definition of the criteria that consents to place the various forms of moral judgment in the subsequent stages. Kohlberg claims that it is crucial for the parallelism between the stages of intellectual development and the development of moral thought. The possession of cognitive skills in a stage is necessary but not sufficient because the relevant features of moral judgment are present. Using interviews similar to those used by Piaget, Kohlberg proposed to the subjects of moral dilemmas, represented by events in which the main character can take different decisions; subsequently he outlined a series of stages of moral development from childhood to adulthood. The notion of the stage is closely linked to that of Piaget: the development of the stages goes from a lower level to a higher level and every individual passes from one stage to the next (the principle of invariance of the sequence). The sequence devised by Kohlberg provides three levels of moral judgment (pre-conventional, conventional, post-conventional), each of which is divided into 2 stages.

The theories discussed above have described moral development as a process of increasing differentiation between moral and non-moral concepts, such as convention, prudence and

pragmatics, where morality emerges from the overall developmental process. Social domain theory departs from this view by proposing that the moral, conventional and psychological domains are separate, self-regulating developmental systems that are not developmentally ordered (see Turiel, 1998; Smetana, 1997; Tisak, 1995; Nucci, 1996). Rather, they are assumed to co-exist from an early age although concepts in each domain are seen to change with age. The results of numerous observational studies (Nucci & Nucci, 1982; Smetana,1989, 1997, as cited by Turiel 2006) are consistent with Piaget in indicating that children's conflicts over moral issues such as object possession, like taking a toy or not sharing a toy, rights, turn-taking, hurting, aggression, teasing or name calling and unkindness (all moral issues) do occur mainly with peers.

Literature described so far shares the viewpoint that claims that the emergence of distinct domains of judgement in early life and their maintenance into adulthood does not mean that such domains of judgment are innate or that changes do not occur with age. As Piaget (1932, as described in Turiel, 2006) suggested, the existence of ways of thinking and acting at 3 or 4 years of age cannot mean that they have an innate or instinctual source, since they already have experienced many social interactions, including influences from their interactions with adults and peers.

So far, I have highlighted some literature on the approach that moral development is acquired by social interactions, now I will consider the other part of the division in psychological explanations of morality and its development that proposes that morality is based on fixed biological dispositions or is innateness. This is an important topic for me since I base a great part of my experimental work on this nativist viewpoint that humans possess innate or instinctual predispositions.

In developmental psychology over the last decades, findings based on looking time methods set off a revolution in how we think about the minds of infants. In the beginning, studies used

methods to emphasize on the early knowledge of physical objects (as described in Killen & Smetana, 2015), suggesting that children consider objects larger than adults do, masses that move as elements, that are solid and subject to gravity, and move in continuous paths through space and time (see Baillargeon, 1987, study with balls). Other studies have found that infants appreciate that individuals have goals revealing rich social understanding (Gergely, Nádasdy, Csibra, & Biro, 1995) and then understand that other individuals have false beliefs (Onishi & Baillargeon, 2005). These findings make it plausible that some basic moral abilities will also be present in infants; therefore, there is no reason to think that it is more problematic for humans to have innate moral capacities than to have innate folk-psychological capacities. Furthermore, if there is an evolutionary need for them both, and there is, since we are social beings, then it is proper to study this hypothesis (that is, that there are innate moral abilities). And these studies (among others) provide empirical evidence for this hypothesis to be true.

There are several moral emotions, including guilt, shame, gratitude and anger, but most developmental research has focused on its compassion or caring for other people (see Killen & Smetana, 2014). Studies on infants just a few months old find that they become distressed and cry when hearing the cry of another baby (Sagi & Hoffman, 1976). Currently, research finds that these reactions are not due to responses to aversive noises or when hearing the sound of their own cry by recordings, they do not cry as much (Dondi, Simion, & Caltran, 1999). There are other studies on emotional concern and engagement in prosocial acts in 1-year-olds (Zahn-Waxler, Radke-Yarrow, Wagner, & Chapman, 1992; Zahn-Waxler, Robinson, & Emde, 1992, see Killen & Smetana, 2015 for review); these infants often soothe individuals in situations where their mother or an experimenter hurts themselves. Furthermore, another study on 18-month-olds found that they are able to willingly give assistance to an adult that shows signs of having difficulty with a task, even if

the person helped is a stranger (Warneken & Tomasello, 2006). In sum, these findings suggest that young children have prosocial tendencies that encourage their social actions and interactions.

The development of the moral sense has become an area of great interest and debate for cognitive science. Moral sense is the capacity to make certain types of judgments. An important theory by Rawls (1971, as described by Hauser, 2006) expanded the understanding of the origin and development of a moral judgment. This theory is based on the analogy between the moral sense and the power of language described by Chomsky. In this proposal, it is assumed that there is a "universal moral grammar" with an innate knowledge that provides the foundations for the development of the moral judgment. The human mind would be equipped with universal principles that guide the development of moral skills. This biological endowment does not determine endogenously a moral system; otherwise, all cultures should develop the same value system. The cultural context specifies the content of principles in a way setting parameters. For this reason, the mechanism of principles and parameters explains the biological and cultural component of the moral system. There are two possible explanations for the development of the "moral sense" by two explanatory models by Hume and Rawls (Hauser, 2006). The "Hume" model, based on the proposition of innateness in the moral sense, without postulating a domain-specific expertise, recognizes the moral capacity to an emotional mechanism that encodes a positive and negative response to social situations leading to a moral judgment output. It is an automatic system studied by social psychology (Haidt, 2001). Finally, there are three possible types of “Rawlsian” model, weak, moderate and strong. The weak type for learning norms is equipped with a mechanism that is not born of any general principle; the moderate type comes with the principles and parameters to build a moral system; the strong type is born with specific moral principles, regardless of culture. Dupoux and Jacob (2007) argued that many cognitive processes, as the perception of color, do not have any grammatical structure and depend on our biological baggage. While not agreeing on the

parallelism between the moral faculty and the moral language, their position has not ruled out the source of the innate moral sense, assuming that moral judgment emerges from automatic emotional responses and that the complex computations take into account the intentions in social interactions.

1.2 Prosocial behavior

In respect to infants showing a moral sense, experimental works have provided evidence that infants are sensitive to the valences of different actions. Premack and Premack (1997) presented 1-year-olds with a computer animated display of spontaneous moving balls, in two positive interactions one ball acted positively towards another ball by caressing it or by helping it get through a narrow gateway, whereas in two negative interactions, one ball acted negatively by hitting another ball or preventing it from achieving its goal. Infants when habituated to positive interactions looked significantly longer when they were shown displays in which a character acted negatively towards another by hitting them and vice versa. These results suggest that infants found a helping action to be similar to a caressing action and a hindering action to be similar to an act of hitting. This study revealed that infants can recognized the commonality of valence shared by the two perceptually distinct prosocial interaction, in this case helping and caressing, and by two perceptually distinct antisocial interactions, in this case, hindering and hitting.

Another study conducted by Hamlin, Wynn and Bloom (2007), found that infants are sensitive to the valence of social interactions when guessing the behavior of others. In this study, infants were shown events in which a character (the climber) attempted to climb a hill. They considered two conditions; in one condition, a character (the helper) pushed the climber from behind to help him climb uphill. In the other condition, a different character (hinderer) pushed the climber downhill. In the test events, the climber was shown, on alternate trials, to approach the helper or the hinderer, and infants looking times to these two events were measured. Results

provided evidence that infants can distinguish these events in their looking times, suggesting that they predicted the climber to hold distinct attitudes toward the two characters. Moreover, theses authors presented a second experiment by placing faces to these characters, making them noticeable social beings, 10-month-olds looked longer towards the scene that violates their expectation, in this case, they looked more when the climber approached the hinderer than when it approached the helper, suggesting that they expected the climber to be motivated to avoid the hinderer but not the helper. An explanation for these findings is that infants demonstrate an understanding of social evaluation, which is also in line with mental attributions to the characters.

The development of prosocial behavior has been studied as early as the first months of life, bringing extensive research on infants, that claim this period is subject to rapid changes biologically, cognitively and affectively (Brownell & Carriger, 1990; Hay, Castle, Demetriou & Stimson, 1999). From the first months of life, there are clear signs of attention towards others and the manifestation of primitive forms of pro-sociality that pushes the child to communicate with others, to approach and take an interest in the activities and emotions of the people around him (Hay, 1994). Between 12 and 18 months, infants react to others' emotions clearly with positive contact and verbal reassurance to mothers and others (Zahn-Waxler, et al., 1992). Another prosocial behavior in early childhood is the sharing of objects as an attitude of comfort against another's "distress", a behavior that tends to emerge as early as 8 months (Hay & Rheingold, 1983). Several studies show that infants are capable of distinguishing the intent of an action from its physical consequences. Infants can already identify the intended goal of an action when outcome is unseen or that fails to achieve the goal (e.i. in 8-month-olds: Hamlin, Newman, & Wynn, 2009; in 12- to 18-month-olds: Bellagamba &Tomasello, 1999; Csibra, Biro, Koos, & Gergely, 2003; Meltzoff, 1995, as described in Killen & Smetana, 2015). In sum, these studies assess infants' capacity to generate social expectations; they do not probe for the possible presence of early moral evaluation.

Therefore, the question is how infants feel about positive and negative social actions toward the actors that are involved.

1.3 Early moral evaluation

A series of recent studies address this issue. Kuhlmeier, Wynn and Bloom (2003), presented 12-month-olds with two computer-animated movies that showed a red ball that had to climb a hill. In one of the movies (the help movie), the ball climbed only halfway to the top of the hill and dropped down, after a second attempt a green triangle, that was observing the scene from the top of the screen, went down to help the red ball climb all the way up. In the second movie (the hinder movie), when the red ball tried the second climb attempt again, a yellow square, also an observer of the scene since the beginning, landed in front of the ball and pushed it down the hill. Would they feel warmly toward the helpful individual, and be negatively inclined toward hindering one? Subsequently, infants were shown, in a different scene without the hill, all three characters, the ball in the bottom and the square and triangle in the top; this was portrayed to measure infants' looking-time preference. Results revealed that 12-month-olds preferred the helpful individual, by demonstrating that they can evaluate an agent's behavior based on previous actions in a different context. These findings were extended to two additional social conditions (Hamlin & Wynn, 2011). In the first condition, 5- and 9 month olds saw a stuffed animal puppet attempting to open the lid of a box, after many attempts, a 'prosocial' puppet (the opener) holds the lid open and helps open the box, another 'antisocial' puppet (the closer) jumps onto the lid of the box, shutting it. In second condition, infants saw a stuffed puppet (the protagonist) playing with a ball and jumping up and down. This puppet accidentally loses its ball to the end of the stage, the ball either rolls towards a prosocial puppet (the giver), which rolls the ball back to the protagonist, or towards an antisocial puppet (the taker), who picked it up and runs offstage with it. In both conditions, infants when encouraged to reach for a prosocial puppet or antisocial puppet, they chose the prosocial character.

In the following paragraphs, I will describe studies that had a similar methodology, only this time observing a different type of social behavior, fair versus unfair allocation of resources, these studies measure looking times considering infants' expectations and preference about fairness.

Geraci and Surian (2011) showed 10- and 16-month-olds animated videos of an interaction between animals: a chicken served as an observer in the distribution of resources (two colored disks), a lion and a bear acted as distributors, a donkey and a cow were used as recipients. Each child watched two fair and two unfair distributions performed by the two distributors. The results showed that children tended to look longer at the scene when the chicken chose to approach the fair distributor, therefore showing their preference towards fair outcomes. At the final testing event (a manual choice task), two silhouettes of the lion and the bear were shown to the infant, and were asked "which one do you want? Pick it up". The 10-month-olds guessed randomly, but the 16-month-olds preferred the fair distributor over the unfair one. In studies using the violation of expectation paradigm (VOE), Schmidt & Sommerville (2011) presented infants with a video in which an adult actor (the distributor) sat at a table with two recipients, each having had a plate or glass in front of them. The distributor had a bowl of crackers (in one movie) or a pitcher of milk (in a second movie). After a black occluding screen appeared, which covered the actors' plates and the contents of the bowl or pitcher. The distributor allocated the crackers or milk to each recipient; the black occluding screen concealed the exact amount distributed. On test trials, when the black screen was removed, infants saw: on equal outcomes, each actor had equal amounts of crackers (or milk); on unequal outcomes, one actor had more crackers (or milk) than the other. Infants showed a significant preference for the unequal outcome over the equal outcome, providing evidence that 15-month-old infants expected resources to be distributed equally to the recipients (see Sloane, Baillargeon, Premack, 2012, for similar results with 19-month-old infants).

In a similar study, 15-month-olds (Sommerville, Schmidt, Yun & Burns, 2013), were presented with scenes in which a distributor allocated four resources between two recipients. The distributor divided two items between each recipient when making an equal distribution, and gave three items to a recipient and one item to the other when making an unequal distribution. This study showed further evidence that infants were attentive to the outcomes of the task showing sensitivity towards an equal distribution. In studies with 10-month-olds, Meristo & Surian (2013) provided evidence that at this age have the capacity to evaluate agents based on their distributive actions. Infants looked longer: when a reward was given to the unfair distributor showing a violation of infants' expectations towards a fair distribution, and when antisocial actions were destined towards the unfair distributor rather than a fair distributor revealing that infants have an emerging sensitivity to fairness (Meristo & Surian, 2014).

Finally, in a study with 21-month-olds, Dunfield and Kuhlmeier (2010) found that infants in their second year distinguished an 'unwilling' actor from an 'unable' actor, choosing to help the unable one. Infants were also equally willing to help an experimenter who managed (after trying) to hand them a toy, and an experimenter who tried but failed to do so. In this study, infants prioritized intent over outcome claiming that infants can understand the intention behind an action and that they can evaluate a behavior towards an agent based on their intent.

After a broad overview of different studies, as described above, we could assume that infants' social judgments are very similar to those of adults. The early emergence of social evaluations and sentiments, suggests that this ability is not entirely coming from experience in a particular social or cultural environment or also to exposure to specific linguistic practices, thus it suggests that there is an innate base to our moral development. Of course, there is still a long way to go, what we have seen until now does not cover moral reasoning as a whole. However, what is important is that what we do find in infants helps us understand the origins of morality.

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1.5 Overview of studies

Study 1

We were interested in verifying the development of the emerging sense of fairness by anticipatory looks and manual preference. In the experiment, infants' looking behavior was recorded during the observation of movies with equal and unequal resource allocation tasks. Sixteen 9-month-olds and sixteen 19-month-olds were presented with six distributions of resources, three performed by a fair and three by an unfair distributor towards two identical recipients. Finally, they were asked to express their preference for the fair or the unfair distributor by manually choosing one of them. Infants did not show any bias in their anticipatory looks, but, the older age group preferred the fair distributor in the manual choice task.

Study 2

Applying the same hypotheses as the previous study (divided as study 1 and 2), we investigated whether 11- and 15-month-olds display an emerging capacity to generate expectations about resource distributions, only this time using movies with real life settings and continuous resources. Infants were presented with 4 trials where milk was distributed, two trials performed by a fair actress and two trials by an unfair actress towards two identical bears. We used 2 types of looking behavior measures (anticipatory looks and looking times) and 2 types of preference tasks (visual preference and manual choice). Finally, 15-month-olds revealed to be able to evaluate agents and have an expectation towards an equitable resource distribution.

Study 3

In this study, we focused on the early development of prosocial behavior, more specifically in helping behaviors. We tested 20- and 30-month-olds to see if after observing an equal and unequal resource allocation task there were differences in helping behaviors. In line with previous findings (Dunfield, Kuhlmeier, O'Connell, Kelley, 2011; Warneken & Tomasello, 2006), we prove once more that the human ability to engage in helping behaviors begins early in development; however, there is no evidence of a tendency by associating equal and unequal distributive actions with helping behaviors.

Study 4

In this study, we report 20- and 30-months-olds' knowledge of the word 'good' in the two core domains of moral reasoning: fairness and harm. To our knowledge, this is the first demonstration of evidence that infants' emerging moral competence is also mapped early onto an appropriate lexical item in the second year of life. We studied infants' manual choice responses towards agents that perform fair/helping actions or unfair/hindering actions. Our results provide evidence that even if there is an already established emerging sense of fairness and harm in 20-month-old infants, these concepts are not yet correctly mapped at a linguistic level until 30 months for the harm domain, and later for the fairness domain.

Study 5

In this final study, we examined whether children of two different societies, Italian and Colombian children, are able to consider merit, studying 3, 4 and 5-6 year old children. We have taken into

account a similar procedure by Baumard, Mascaro and Chevallier (2012), revealing that children sometimes favor equality when given the chance, and that they have an underlying ability to understand that a greater contributor has the right to more than a lesser contributor. We presented children an acted out scenario with bears. Children were presented with two characters, a hardworking and a lazy working bear that were asked by an experimenter to play a game of building up a house. One worked more by finishing the house and the other less by giving up and not finishing. We evaluated children's biscuit distributions. We did not find that children as young as three, or up to six, of two very different societies are able to consider merit or also have an egalitarian choice when given the chance.

PART TWO: EXPERIMENTAL WORKS: THE EMERGING SENSE OF FAIRNESS, LOGIC OF MERIT AND PROSOCIAL BEHAVIOR IN INFANTS AND PRESCHOOLERS

Chapter 2

Do infants evaluate agents' fairness? An eye-tracker study

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(In preparation)

Abstract

Recent studies on looking times suggest that infants display an emerging capacity to generate expectations about resource distributions. We investigated the development of the emerging sense of fairness using both anticipatory looks and manual preference. Infants were tested by recording their looking behavior during the observation of short movies showing equal and unequal resource allocations. Participants were 16 9-month-olds and 16 19-month-olds. After a familiarization phase, infants were presented with six distributions of resources, three performed by a fair and three by an unfair distributor towards two identical recipients. Finally, infants were asked to express their preference for the fair or the unfair distributor by manually choosing one of them. Anticipatory looks did not reveal any expectation of fairness, but the 19-month-olds preferred the fair distributor in the manual choice task.

2.1 Introduction

Is the ability to generate moral judgments (evaluations of the actions or character of a person that are made as a result to a set of virtues held to be obligatory by a culture, see Haidt, 2001) present in early childhood? Is it acquired by means of innate domain specific mechanisms? Classical cognitive-developmental theories on moral development suggested that this is not the case (Piaget, 1932; Kohlberg, 1971). As Piaget (1932) noted, the existence of ways of thinking or acting by age 3 cannot be taken to mean that they have an innate or instinctual source, considering the fact that by this age children have already been exposed to experience brought upon by multiple social interactions, including influences from their interactions with adults. Therefore, Piaget describes from experience using verbal methods that a child's sensitivity to moral judgments develop very gradually and follow a phase-like progression from three kinds of rules: irrelevant rules (giving according to their own preference), simple egalitarian rules (everyone gets the same, equality) and complex merit-based rules (giving based on how someone contributed to a task, equity) (Piaget, 1932).

These rules have been studied in several investigations that have operated verbal methods and have provided evidence that sensitivity to moral rules do not emerge until the preschool years or later (Fehr, Bernhard & Rockenbach, 2008; Damon, 1975; Fehr, Glätzle-Rützler & Sutter, 2013; Lane & Coon, 1972; Moore, 2009; Olsen & Spelke, 2008; Rochat, Dias, Liping, Broesch, Passos-Ferreira, Winning & Berg, 2009; Shaw & Olsen, 2013; Shaw, Montinari, Piovesan, Olson, Gino & Norton, 2014; Ugurel-Semin, 1952). However, in the last decades, alternative research has proposed a quite different view: moral development takes off starting from very early-emerging sociomoral intuitions (Dupoux & Jacob, 2007; Green, 2005; Premack, 2007). To provide evidence to the empirical question of whether sociomoral expectations are already present in infancy, we aim to deepen the study of the development of

children's social cognition focusing on the "sense of fairness" or equality using resource allocation tasks.

Current research on looking times suggest that infants display an emerging capacity to generate fair expectations in resource allocation tasks by taking into account agents' distributive actions. In particular, Schmidt and Sommerville (2011) provided evidence that 15-month-olds expected resources to be distributed equally when observing others (a third party). This study presented a sequence of movies showing the infant an actor allocating continuous (milk) and discrete (crackers) resources to two recipients; the outcome of the resource distribution was occluded by a black screen, at the final test phase of each movie a still frame depicted an equal and an unequal outcome. Infants looked significantly longer to the unequal versus the equal outcome, suggesting that these events violated infants' expectation (VOE) of third-party fairness. This result reveals the presence of rudimentary expectations as early as 15 months on equitable distribution of resources between interacting individuals. In another study with movies, Geraci and Surian (2011), showed 16-month-olds two distributive puppets (a lion and a bear), two receiver puppets (a donkey and a cow) and an observer (a chicken). One of the distributive puppets gave each receiver one multicolor disk, the other gave one receiver two disks and the other receiver nothing. Infants expected other agents to affiliate with or approach fair over unfair distributors and with a manual choice test, the authors demonstrated a significant tendency to pick up the fair rather than the unfair distributor. Similarly, Sloane, Baillargeon and Premack (2012) showed that 19-month-olds expected a distributor to divide resources equally using live events where an experimenter divided two resources between two animated puppets (giraffes) , also when having inanimate objects and when showing the resources from the recipients (removing covers from in front, revealing the resources) instead of distributing them.

Sommerville, Schmidt, Yun and Burns (2013) presented 15-month-olds with movies in which a distributor allocated four resources between two recipients. The distributor divided two items between each recipient when making an equal distribution, and gave three items to a recipient and one item to the other when making an unequal distribution. These authors found again that infants were attentive to the outcomes of the task showing a sensitivity towards an equal distribution. And, Meristo and Surian (2013) found yet in 10-month-olds a preference towards the fair distributor. In this study, infants first watched equal and unequal distributions carried out by a fair and an unfair distributor including also an observer who witnessed their actions. The observer later gave one resource to either the fair or the unfair distributor respectively showing a preference for the equal or the unequal event. Infants looked longer when a reward was given to the unfair distributor showing a violation of infants' expectation towards a fair distribution. Subsequently, Meristo and Surian (2014) carried out a similar study, only this time a third agent hits or takes resources away from either the fair or the unfair distributor. Results reveal that infants look longer when antisocial actions were destined towards the unfair distributor supporting, yet again, the fact that infants are able to evaluate agents based on their distributive actions. What all studies until this point have in common is that they find positive results on infants' tendency of expecting an equal distribution by considering how much they looked at outcomes in resource allocation tasks.

Another way of measuring a child's expectation is by using an anticipatory looking paradigm. Particularly, false belief studies have shown that by anticipatory looking behavior there is a correct prediction of an actor's actions, in 25-month-olds (Southgate, Senju & Csibra, 2007) and also down to 18-month-olds (Senju, Southgate, Snape, Leonard & Csibra, 2011). In the anticipatory looking paradigm, the child's specific expectation of where the actor will search is measured, and it could help to address the question of where the child specifically

would expect a distributor or agent to allocate their available resources in a resource allocation task. However, in these types of tasks in order to understand if the child has a sensitivity to fairness, the attempts to date have not been encouraging since there has not been any salient effects in anticipatory looking behaviors (Geraci & Surian, 2011).

Taking into account all recent literature, the present experiment was aimed at studying the early social evaluations to assess the understanding of the emerging sense of fairness in infants, by taking into account the outcome of distributive actions and reasoning about a distributor's actions. We modeled our procedure around Geraci and Surian's (2011) study. The task was simplified by introducing directly two recipients and immediately after showing the test events. We presented a total of six test events, 3 involving an agent that distributed two strawberries equally to each recipient and 3 involving another agent that distributed two strawberries to only one of the two recipients. We wished to see, if by simplifying the task, we could enable a response through visual anticipation when an agent is performing distributive actions. And also, how this type of paradigm (anticipatory looks) can be another valid instrument that can be used to assess the "sense of fairness" in infants. Later, based on these distributive action outcomes we observed if infants are able to identify the distributor/agent by a manual choice task. Therefore, we hypothesized that infants reveal: (1) a fair expectation in the resource allocation task, and (2) a preference for the egalitarian distributor/donor in the manual choice task.

2.2 Method

2.2.1 Participants

Thirty-two infants participated: 16 9-month-olds (6 females; mean age = 9 months and 15 days, SD =1 month and 9 days, range = 7 - 12 months) and 16 19 month-old infants (5 females; mean age = 19 months and 15 days, SD = 2 months and 9 days, range = 16 – 22 months) made the older group. An additional 8 9-month-old infants were excluded for fuzziness (N = 2), inability to get a calibration (N = 3), or by looking at less than 3 out of 6 of the target areas (N= 3), and an additional 4 19-month-old infants were excluded for fuzziness (N = 1), inability to get a calibration (N = 1), or by looking at less than 3 out of 6 of the target areas (N= 2).

2.2.2 Procedure and Stimuli

The province of Trento's coordinator for daycares was in charge of contacting and sending all daycares an information sheet and consent form with all the information regarding the study to give out to all the parents. Some participating families were contacted by normal mail, this contact information taken from the database of the town hall among families who were living in the Rovereto area (Italy). Infants were tested at five different daycares or the Department of Psychology and Cognitive Science, University of Trento. The experimental procedure was approved by the local ethics committee (University of Trento).

During test sessions, infants were tested individually in a quiet room. They were seated on an educator or parent's lap with a distance of 50-70 cm from the eye-tracker. They were presented with cartoon animations created with Adobe Flash Professional and showed on a 17" inch monitor running the Tobii Studio 3.0.0 software. During the screening of the films, the

gazing behavior of infants was detected and recorded with the Tobii eye-tracker T120 device. Infants were also videotaped using two video cameras (Panasonic SDR-H20, Sony handycam DCR-HC27E), one in front and one behind the child; these recordings have been used to verify the data collected with the eye-tracker concerning the direction of the eye-gaze, and some other observational aspects needed for the test events.

Following a 2-point calibration phase, infants were presented with two test events, each consisted of a familiarization phase and a distribution phase. In the familiarization phase, there were two identical green triangles, with schematic mouths and eyes, presented on the upper side of a screen on a grey background, one on the left side and one on the right side (11 cm's apart from each other). Both triangles moved in lateral directions twice (1 cm) at the same time (4 seconds elapsed) (see Fig.1a). Familiarization phase is important because it provides infants with dynamic cues about the agentive nature of the receivers.

In the distribution phase, infants were presented with six distributions of resources (i.e., two strawberries) performed by two distributors (either a yellow circle or a blue square, both with eyes and mouth). The distributor gives strawberries to two triangles (the two green triangles presented in the familiarization event), henceforth the 'recipients'. At the beginning of each trial, the distributor appears from below the screen with two strawberries (see Fig.1b) and it allocates a strawberry to a recipient and then returns to its initial position (see Fig.1c). When the first triangle receives the strawberry, it jumps once. Afterwards, a brown occlusive screen is lowered from above hiding almost all the upper half of the grey background including the bottom part of the recipients (only the upper part of the two triangles remained visible) (see Fig.1d). Therefore, infants were prevented from seeing the outcome of the second strawberry's assignment when the distributor allocates it. The moment the triangle receives the second strawberry, it jumps once, revealing its position. Three seconds elapse from the moment the

distributor disappears behind the screen to the moment before the recipient jumps. This was the time infants' anticipatory looks were recorded (see Fig.1e). The distributor could, depending on the scene, assign the second strawberry to the triangle that had already received one previously (unfair distribution) or to the triangle that had not yet received one (equal/fair distribution). At the end of the scene, when the distributor returns to the initial position, the occlusive screen was raised and an equal or unequal distribution outcome was revealed (see Fig.1f). Each test event stimuli lasted 23 seconds.

Each infant saw three equal (E) and three unequal (U) allocation of resources presented in two test orders (Order 1: EUUEEU; Order 2: UEEUUE). Equal distributions were all performed by the same agent, the 'fair distributor', while unequal distributions were all performed by the other agent, the 'unfair distributor'. The following variables were counterbalanced across participants: test order, identity of the fair and unfair agent, and side of the triangle that received the first strawberry.

Infants' behavior was analyzed by two types of responses:

Anticipatory measures. Two anticipatory measures were recorded during the distribution phase in all six trials. 1) First anticipatory looks, and 2) Anticipatory looking times. Both measures taken from the moment the distributor disappeared with the second strawberry behind the occlusive screen to the moment before the recipient jumped. Four Areas of Interest (AoI's) were created, two (broad and narrow) including the side of the triangle that had already received the strawberry (Unfair allocation) and two including the side of the triangle that had not yet received the strawberry (Fair allocation) (see Fig. 2).

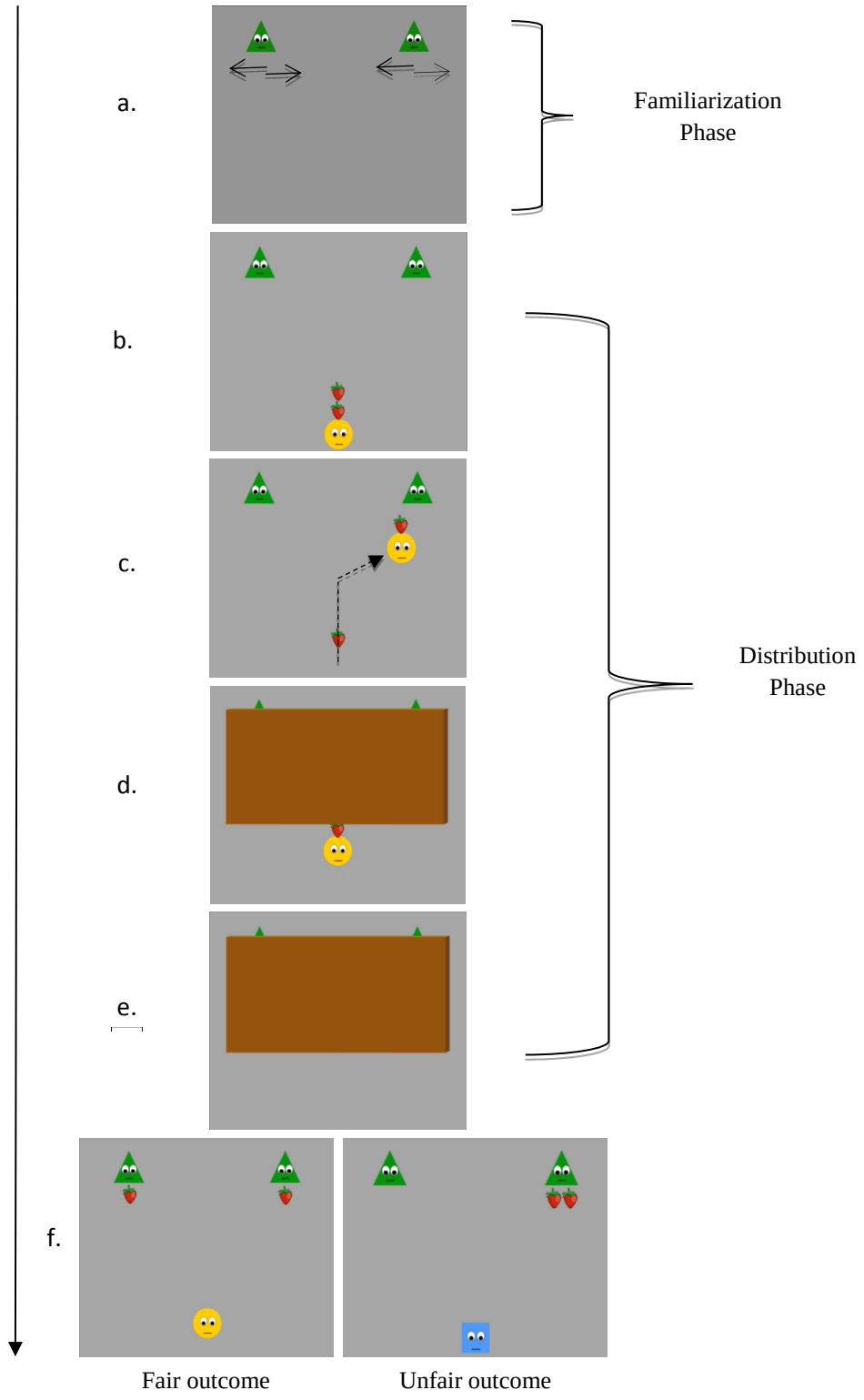

Figure 1. Video sequence of test events: familiarization phase and distribution phase with the two possible outcomes: an equal or unequal distribution. All scenes have two green triangle recipients which initially are given a strawberry (only one of them, Left/Right) later to be occluded by a brown rectangular screen when an agent (fair or unfair) is distributing the second strawberry.

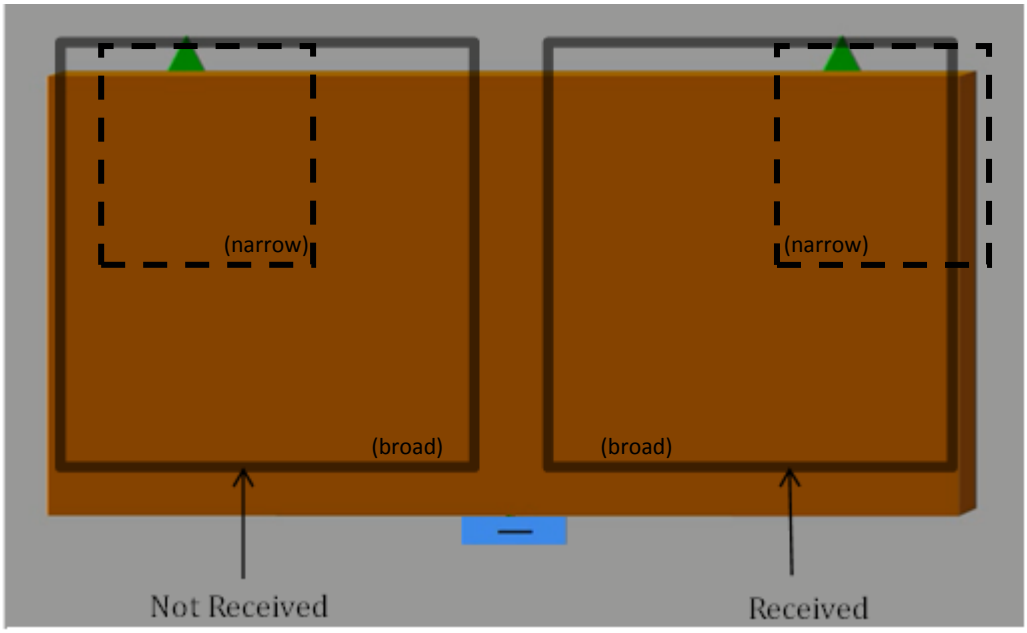

Figure 2. AoI's created for the analysis of anticipatory looks. The two areas (broad and narrow) written as Not Received is where the agent has not yet received a strawberry, and the Received are the areas (broad and narrow) where it has already received one.

Manual choice task. Immediately after having seen the last test event, infants were presented with a manual choice task. A 32 cm x 21 cm white tray with two 6 cm x 6 cm cut-out 41tyrofoam shapes representing the distributors (i.e., the yellow circle and the blue square) was placed in front of the infant (see Hamlin, Wynn and Bloom, 2007 for procedural details). If infants did not spontaneously reach for one of the two shapes, after 5 seconds they were encouraged to pick up one by asking them: 'Which one do you want? Pick it up'. About half of the participants saw the fair agent on the left and the unfair agent on the right, and the others saw the reverse disposition of the distributors. Infants' preferences for the fair or unfair agent were analyzed by coding their answers at the manual choice task. Two experimenters coded independently infants' responses, one was blind to the fairness of the donor. The inter-judges agreement was 100%.

2.3 Results

Preliminary analysis showed that there was not a significant influence of the test order, the identity of the fair and unfair donors and the side of the triangle that received the first strawberry on the first anticipatory looks and on the anticipatory looking times.

Anticipatory looks. This measure is divided by two levels, first anticipatory looks and anticipatory looking times.

1. First anticipatory looks measures the side of the first anticipatory looks infants made on the two AoI's, reported on Table 1. Infants of both age-groups did not show any bias for one of the two broad AoI's (two-choice binomial test, two tailed, all *p*s > .21), although, for the third trial 9-month-olds looked more times towards an unfair allocation on the narrow AoI's (two-choice binomial test, two tailed, $p = .001$), this information is not relevant because there is no pattern of this 'unfairness' in the rest of the trials (two-choice binomial test, two tailed, all *p*s > .08). the older group showed no significant bias in any of the sides of the narrow AoI's in all trials (two-choice binomial test, two tailed, all *p*s > .21).

Table 1

First anticipatory looks in both broad and narrow AoI's.

	9 months					19 months				
Trial	**Unfair Allocation**		**Fair Allocation**			**Unfair Allocation**		**Fair Allocation**		
	b	**n**	**b**	**n**	**0**	**b**	**n**	**b**	**n**	**0**
1	9	4	7	12	0	9	5	7	10	1
2	8	5	7	4	8	8	5	7	8	4
3	10	14	6	0	9	7	11	6	5	8
4	6	6	6	1	13	9	5	6	8	4
5	7	7	4	2	12	11	6	5	10	0
6	4	3	9	4	12	7	4	6	7	8

Note. b = broad AoI's; n = narrow AoI's; 0 = no anticipation. Frequency of where the infant looked first in the AoI's. Unfair allocation = AoI where the triangle had already received a strawberry; Fair allocation = AoI where the triangle has not yet received a strawberry.

In order to see if there is a possible learning effect in the first anticipatory looks, we took into account the AoI's (broad and narrow) of the first anticipatory looks in both age groups of all six trials, and observed if infants were consistent to the areas where there was a fair allocation (infant expects the fair agent to give a fair distribution) or an unfair allocation (infant expects the unfair agent to give an unfair distribution). And also, if the AoI's where infants first looked were not consistent to the areas where there was a fair allocation (infant expected the fair agent to give an unfair distribution) or an unfair allocation (infant expected the unfair agent to give an fair distribution).

As reported on table 2, there was no pattern aligning a possible learning effect in both broad and narrow AoI's in both age groups. In the broad AoI's for the first and second trial infants in both age groups showed that both consistent and not consistent views were at chance (first trial: 56% consistent, 44% not consistent, and second trial 50% consistent and 44% not consistent) proving that they had no previous knowledge of the agents' behaviors. In the following trials, there was a decrease in consistent and not consistent views from 9-month-olds, a part from the third trial that went up to 10 (63%) in the not consistent views in the broad AoI's. In the broad AoI's, 19-month-olds showed an increase in consistent views in the fifth trial (11, 69%), but in the sixth the views decreased to 7 (44%). Lastly, there was a decrease in not consistent views from the third trial on (5, 50%; 6, 38%; 5, 31%; 6, 38%). In the narrow AoI's there were less views than the broad AoI's, nonetheless, it showed a similar pattern.

Table 2

Consistent and not consistent views in both broad and narrow AoI's.

	9 months				19 months			
Trial	**Consistent views**		**Not consistent views**		**Consistent views**		**Not consistent views**	
	b	**n**	**b**	**n**	**b**	**n**	**b**	**n**
1	9 (56%)	10 (63%)	7 (44%)	6 (38%)	9 (56%)	9 (56%)	7 (44%)	6 (38%)
2	8 (50%)	5 (31%)	7 (44%)	4 (25%)	8 (50%)	6 (38%)	7 (44%)	7 (44%)
3	6 (38%)	7 (44%)	10 (63%)	7 (44%)	5 (31%)	5 (31%)	8 (50%)	9 (56%)
4	7 (44%)	5 (31%)	5 (31%)	2 (13%)	9 (56%)	5 (31%)	6 (38%)	8 (50%)
5	7 (44%)	6 (38%)	4 (25%)	3 (19%)	11 (69%)	10 (63%)	5 (31%)	6 (38%)
6	6 (38%)	4 (25%)	7 (44%)	3 (19%)	7 (44%)	6 (38%)	6 (38%)	5 (31%)

Note: b = broad AoI's; n = narrow AoI's. Frequency (with percentage) of consistency and inconsistency in the AoI's (broad and narrow) of all six trials in both age groups. Consistent views = Infant looked at the AoI where fair agent allocated the second strawberry to the recipient with no strawberry or the AoI where Unfair agent allocated the second strawberry to recipient with a strawberry. Non consistent views= Infant looked at the AoI where fair agent allocated the second strawberry to the recipient with a strawberry or the AoI where Unfair agent allocated the second strawberry to recipient with no strawberry.

2. Looking times measures the overall duration of fixations in the two AoI's. There was no significant differences in the average anticipatory looking times on the two broad AoI's (all *p*s >. 32) and the two narrow AoI's (all *p*s >.09) in all six trials for both age groups (see Tab. 3)

Table 3

Mean looking times (and SD) during anticipatory looks in both broad and narrow AoI's.

	9 months				19 months			
Trial	**Unfair Allocation**		**Fair Allocation**		**Unfair Allocation**		**Fair Allocation**	
	b	**n**	**b**	**n**	**b**	**n**	**b**	**n**
1	.62 (.56)	.43 (.55)	.90 (.71)	.55 (.60)	.90 (.71)	.63 (.17)	.91 (.69)	.66 (.51)
2	.54 (.56)	.35 (.47)	.48 (.60)	.24 (.41)	.70 (.75)	.45 (.63)	.88 (.74)	.77 (.65)
3	.78 (.55)	.67 (.58)	.45 (.35)	.24 (.35)	.71 (.75)	.54 (.76)	.70 (.57)	.53 (.50)
4	.42 (.51)	.32 (.49)	.26 (.40)	.17 (34)	.65 (.65)	.50 (.61)	.87 (.63)	.66 (.57)
5	.53 (.63)	.40 (.55)	.27 (.41)	.15 (.30)	.31 (.38)	.20 (.29)	.85 (.59)	.66 (.56)
6	.36 (.74)	.27 (.62)	.27 (.45)	.17 (.31)	.52 (.61)	.29 (.40)	.45 (.52)	.29 (.10)

Note: b = broad AoI's; n = narrow AoI's. *t*-tests were used to measure means.

We tested the influence of age on looking times with a 2 (group: younger vs. older) x 2 (AoI's: unfair allocation vs. fair allocation) x 6 (trials) ANOVA. A main effect of group ($F(1, 30)= 9.025$, $p = .005$, $\eta 2 = .23$, $\delta = .83$) and of trials ($F(5, 26) = 4.903$, $p = .003$, $\eta 2 = .48$, $\delta =$

.95) were found on the broad AoI's. Older infants looked on average longer at the six trails (M = .70, SD = .051) than younger infants (M = .50, SD = .052). The first trial received longer fixations (M = .83, SD = .05) than the fourth (M = .55, SD = .07, p = .026), the fifth (M = .49, SD = .06, p = .001) and the sixth (M = .40, SD = .06, p < .001) trials. However, only a main effect of group was found on the narrow AoI's (F(1, 30)= 6,087, p = .020, η2 = .17, δ = .67).

Finally, in order to look for a possible learning effect on the two types of distributors (fair distributor or unfair distributor) seen in the previous trials, we analyzed the anticipatory looking times in all 6 trials. A 2 (AoI: same receiver vs. different receiver) x 2 (type of donor: fair donor vs. unfair donor) x 6 (trials) ANOVA was performed with AoI and trial as within subjects factors. No significant main effects or significant interactions were found for both groups in the broad AoI's. More specifically, there was no significant interactions between the type of donor and the AoI: the average time the younger group looked at the triangle who had not yet received the strawberry when the donor was fair or unfair did not differ from the average time they looked at the triangle who had already received the strawberry when the donor was fair or F(1, 14) = .003, p = .96, η2 = .00, δ = .050. The average time the older group looked at the triangle who had not yet received the strawberry when the donor was fair or unfair did not differ significantly from the average time they looked at the triangle who had already received the strawberry when the donor was fair or unfair F(1, 14) = 1.015, p = .33, η2 = .07, δ = .16. For the narrow AoI's, again there was No association between the type of donor (fair agent vs. unfair agent) and the AoI in which infants made their first anticipatory look (fair allocation vs. unfair allocation) in all trials: younger group F(1, 14) = .041, p = .84, η2 = .003, δ = .054, older group F(1, 14) = .001, p = .97, η2 = .00, δ = .050.

Manual choice task. Two infants in the younger group and 4 in the older group did not choose any agent. Among those who answered to the task, in the younger group, 6 infants picked up the fair distributor (43%) and 8 chose the unfair distributor (57%) and the difference in the choices was not significant, two-choice binomial test, two-tailed, $p = .79$. In the older group, 10 infants picked up the fair distributor (83%) and 2 chose the unfair distributor (17%). In this group of age, the difference in the choices was significant, showing a preference for the 19-month-olds to choose the fair distributor, two-choice binomial test, two-tailed, $p = .04$ (see Figure 4).

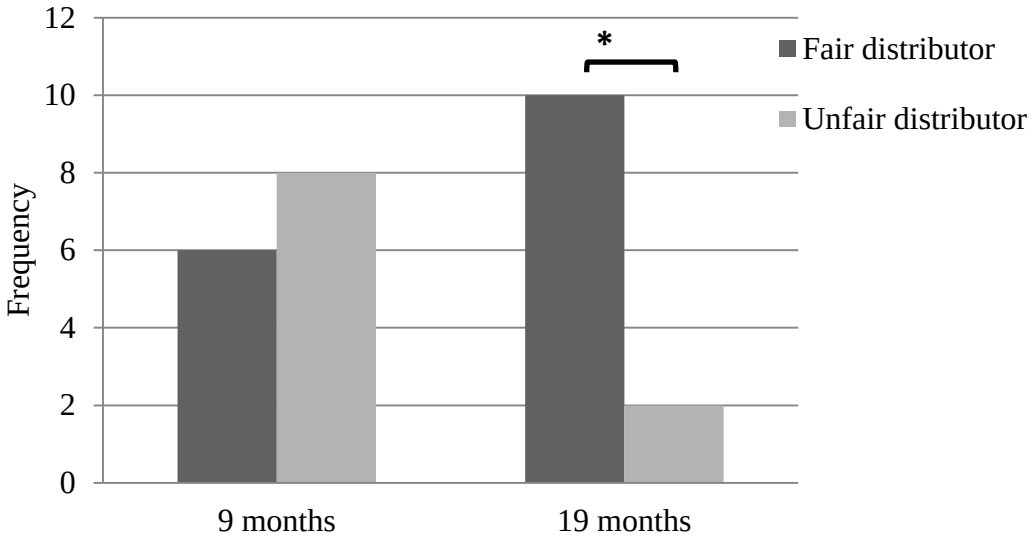

Figure 4. Frequency of infants who chose the fair or the unfair distributor in the manual choice task.

2.4 Discussion

In this study, we investigated whether 9- and 19-month-olds are sensitive to fairness in a resource allocation task. Overall, the results of the present study suggest that infants aged 19 months, revealed an emerging sensitivity to fairness when choosing manually between a fair and an unfair distributor, after observing resource distributive actions. Additionally, this

'preference' for the fair agent in the manual choice task demonstrates that children were sensitive to the different outcomes given by the agents that distributed the strawberries. This finding confirms previous results that showed children at this age should already have this type of sensitivity (Geraci & Surian, 2011; Schmidt & Sommerville, 2011; Sloane et al., 2012). However, there was no important effect when analyzing if the child had an equal or unequal expectation once the strawberry was given to the second recipient, nor a particular visual exploration revealing infants' inclination for any of the distributions, therefore, this also confirms that even by simplifying the scenes, a visual anticipation of the agents' outcomes was still not detected by children of both age groups. This proves, once more, that measuring anticipatory looks in order to demonstrate an infant's expectation is still not accessible at this age (Geraci & Surian, 2011, Southgate et al., 2007).

Nevertheless, we can suggest that based on our results older participants reveal a better understanding of what was happening in the trials because of their positive responses favoring the fair distributor in the manual choice task. An explanation for these results may be due to the fact that they looked reliably longer at all six trials than the younger infants showing attentiveness towards the administered outcomes (Sommerville et al. 2013).

Have we proven if the ability to generate moral judgments is present in early childhood? Moreover, if this is the case, is it acquired by means of innate domain specific mechanisms? Authors like Hamlin (2013), argue that already there is strong evidence supporting this claim, in fact, her previous works has contributed to the nativist approach describing how human infants demonstrate morally relevant motivations and evaluations that do not appear to be brought on from socialization or moral specific experiences (Hamlin et al., 2007; Hamlin & Wynn, 2011). Our study supports this conclusion by revealing that by 19 months, infants show sensitivity to moral reasoning since they have the capacity of understanding agents'

dispositions based on their distributive action outcomes. We can also think that there might be some indirect sensibility to moral emotion towards the distributors (or agents), a type of empathic reaction associated to the pain produced in the victims of such unfair distributions (Hoffman, 1991). However, this assumption is withdrawn from previous conclusions that show that there is no relation between early negative evaluations and infant's empathic reaction towards victims of such distributions with the understanding of agents' goals (Gergely & Csibra, 2003; Geraci & Surian, 2011). Overall, despite infants' rudimentary exposure to external stimulation or parental education, infants' sole preference towards a fair distributor or agent is empirical proof that there is in fact an innate sensitivity to abstract principles of fairness or equality.

Our study is in line with the data found to date regarding both age groups (Geraci & Surian, 2011; Sloane et al, 2012). These findings have begun to contribute to issues worth studying, like determining at what age infants first prefer fair allocations and discovering whether this initial preference involves a simple concept of equality, individuals should be treated equally, and not by what individuals deserve, e.g. rewarded by the amount of work done (Sloane et al., 2012). In addition, it is important that by considering the anticipatory looking paradigm instead of the violation of expectation paradigm we could be observing a more explicit result in resource allocation tasks, due to the fact that it is more specific where infants expect a distributor to allocate their available resources. In sum, even if our findings do not show specific anticipatory looking behavior from infants as young as 19 months in equal and unequal resource allocation tasks, it still opens a completely different approach of how we measure the understanding of a child's expectation.

Reviewing previous literature and assuming that in fact there is an innate sensitivity in each child when they are born, there may be a possibility that heritance can play a role when

talking about different levels of this kind of sensitivity, i.e. An infant from a sociopath or an infant from a minister. This may perhaps be explained by identifying a genetic code in future research (Joyce, 2006). Up to now, the type of empirical research we carried out in this study can only explain this statement. Nevertheless, assuming that early social stimulation could result in the same level of morality, if so; could this be a good alternative for a much better society if all children are intervened early in life?

For future studies, it is important to point out that there can be further investigation regarding infant's anticipatory looking behavior considering the fact that infants use a lot of anticipatory behavior in their daily life, like, knowing what comes after a determined action or acting towards an expected behavior (i.e. ring around a rosie). However, we have proven that infants as early as 19-months do not demonstrate to have an expectation when observing equal and unequal distributive actions. As for the procedure, it would be interesting to use a more realistic scenario to see if we are able to pull down the age group (Hamlin et al., 2007; Southgate et al., 2007). In conclusion, this study affirms the fact that our species is indeed based on innate predispositions when speaking about moral thought and action, and this is very important to understand the origins of social cognition.

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Chapter 3

Infants' expectation of a fair distribution of continuous resources. An eye-tracker study with 11- and 15-months old infants

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(In preparation)

Abstract

We report findings concerning the development of the emerging sense of fairness in 11- and 15-month-olds, a topic that has attracted a lot of attention and led to homogeneous results. We were interested in studying whether infants display an emerging capacity to generate expectations about resource distributions using movies with real life settings and continuous resources. In the experiment, infants were presented with 4 trials where milk was distributed, two trials performed by a fair actress and two trials by an unfair actress towards two identical bears. Infants were tested by recording their looking behavior during the observation of movies with equal and unequal resource allocation tasks using 2 types of looking behavior measures (anticipatory looks and looking times) and 2 types of preference tasks (visual preference and manual choice). 15-month-olds revealed to be able to evaluate agents and have an expectation towards an equitable resource distribution.

3.1 Introduction

Do humans possess spontaneous evaluation skills that are applied to agents' distributive actions? Less than a decade of research on looking times suggests that this is in fact the case. Studies on 15-month-olds reveal that infants look significantly longer to the unequal versus the equal outcome, suggesting that these events violated infants' expectation (VOE paradigm, see Hamlin, Wynn, & Bloom, 2007), which claims the presence of rudimentary expectations for a fair distribution of resources (Schmidt & Sommerville, 2011; Sommerville, Schmidt, Yun & Burns, 2013). In a study (Schmidt & Sommerville, 2011), infants were presented with a video in which an adult actor (the distributor) sat at a table with two recipients, each having had a plate or glass in front of them. The distributor had a bowl of crackers (in one movie) or a pitcher of milk (in a second movie). After a black occluding screen appeared, covering the actors' plates and the contents of the bowl or pitcher. The distributor allocated the crackers or milk to each recipient; the black occluding screen concealed the exact amount distributed. On test trials, when the black screen was removed, infants saw: on equal outcomes, each actor had equal amounts of crackers (or milk); on unequal outcomes, one actor had more crackers (or milk) than the other. Infants showed a significant preference for the unequal outcome over the equal outcome, providing evidence that 15-month-old infants expected resources to be distributed equally to the recipients (see Sloane, Baillargeon, Premack, 2012, for similar results with 19-month-old infants).

In another study, 15-month-olds (Sommerville et al., 2013), with a similar procedure to Schmidt and Sommerville (2011) only this time without continuous resources, were presented with scenes in which a distributor allocated four resources between two recipients. The distributor divided two items between each recipient when making an equal distribution, and gave three items to a recipient and one item to the other when making an unequal distribution. This study showed

further evidence that infants were attentive to the outcomes of the task showing a sensitivity towards an equal distribution using VOE.

In a study with 16-month-olds Geraci & Surian (2011), revealed that infants use information about how an agent distributes resources to guide their expectations of subsequent social interactions involving distributors and recipients, as well as their own preferences for different kinds of distributors with a manual choice task. Infants looked longer when the agent approached the fair distributor. In addition, when given a manual choice task, 16-month-olds selected the fair over the unfair distributor. In studies with 10-month-olds, Meristo & Surian (2013) provided evidence that at this age have the capacity to evaluate agents based on their distributive actions. Infants looked longer: when a reward was given to the unfair distributor showing a violation of infants' expectations towards a fair distribution, and when antisocial actions were destined towards the unfair distributor rather than a fair distributor revealing that infants have an emerging sensitivity to fairness (Meristo & Surian, 2014).

Placing together all previous studies, the results reveal that during the second year of life infants expect goods and resources to be allocated equally to recipients, prefer agents that perform fair (equal) distributions, and expect other agents to affiliate with or approach fair over unfair distributors. Infants' expectations do not appear to be reducible to perceptual biases (e.g., preferences for 'asymmetry': in continuous and categorical quantities) and are flexible based on the social context.

In order to prove this point, we created two studies where we were interested in analyzing whether an early sense of fairness emerges already at 11 and 15-months of age using a resource allocation task of continuous resources. We tested each age groups separately to observe if there is a notable developmental change. Infants were tested by recording their looking behavior during the

observation of movies with a realistic setting. Infants saw two distributive agents allocating milk to two teddy bears: one agent allocated resources in a fair way and the other one in an unfair way. The outcomes of fair or unfair distributions differed for the asymmetry in the amount of milk that the distributor gave to the recipients. The expectation about a fair distribution was analyzed adopting a research paradigm that has proven effective for studying the real expectation in pre-verbal children in the field of Theory of Mind (Southgate, Senju, & Csibra, 2007) and also the VOE paradigm.

Finally, we predicted that infants would: a) anticipate an equal distribution (as indexed by the side on which they made a fixation a moment before they knew the second distribution was to happen). b) notice when the outcome of the distribution was unequal following the violation of expectation paradigm (i.e., look longer at the unexpected unequal outcome of distributions). c) show a preference for the fair or unfair distributor (visual preference: looking longer to one of the two; manual preference: reaching for the picture of the fair or unfair distributor in a manual choice task).

3.2 Study 1

3.2.1 Method

3.2.1.1 Participants

Thirty-two 11-month olds (19 females; mean age = 351.34 days, SD = 22.35; range = 311-383 days) took part in the study. An additional 12 infants were excluded for: fuzziness (n = 4), an inability to get a calibration (n = 5), crying (n = 2) which made impossible the recording of eye-movements, and an experimental error (n = 1).

3.2.1.2 Materials and Procedure

Five daycares were contacted in Rovereto (Italy). Also, some participating families were contacted by normal mail, this contact information was taken from the database of the town hall among families who were living in the area. An information sheet and consent form with all the information regarding the study was handed out to all the parents. The experimental procedure was approved by the ethics committee of the University of Trento. Infants were tested individually in a quiet room at five different daycares or the Department of Psychology and Cognitive Science, University of Trento. Children were seated on a caregiver's (educator or parent) lap at a distance of approximately 60 cm from the monitor.

Infants were videotaped using two video cameras (Panasonic SDR-H20, Sony handycam DCR-HC27E), one in front and one behind the infant; these recordings have been used to verify the data collected with the eye-tracker concerning the direction of the eye-gaze, and some other observational aspects needed for the final distribution phase.

We used a Tobii eye-tracker T120 device to detect infants' eye-movements during the presentation of movies on a 17" TFT monitor. Caregivers were asked to close their eyes during eye-movement registration. The presentation of the video was run through the software Tobii Studio 3.0.0. Before the presentation of the animation stimuli, a calibration session was always run (for details on this procedure see Gredebäck, Johnson & von Hofsten, 2010).

Infants were presented with two test events, each consisted of a familiarization phase and a distribution phase. In the familiarization phase, infants were presented with two trials. In these trials, a girl carrying a jug full of milk entered the scene (Fig. 1a) and went behind a panel with a green window leaving her head in full view. In front of the panel, there was an empty glass underneath the window and a teddy bear next to it. When the window illuminated a chime rang

simultaneously (Fig. 1b). After three seconds the light went off, and the actress opened the window and poured some milk into the glass (Fig. 1c). The two scenes differed only in the identity of the distributor: on one trial children saw a girl with a pink visor with three vertical straight white stripes and on the other trial they saw a different girl wearing an orange visor with a single white zigzag line. The order of presentation of the two familiarization trials was counterbalanced across subjects.

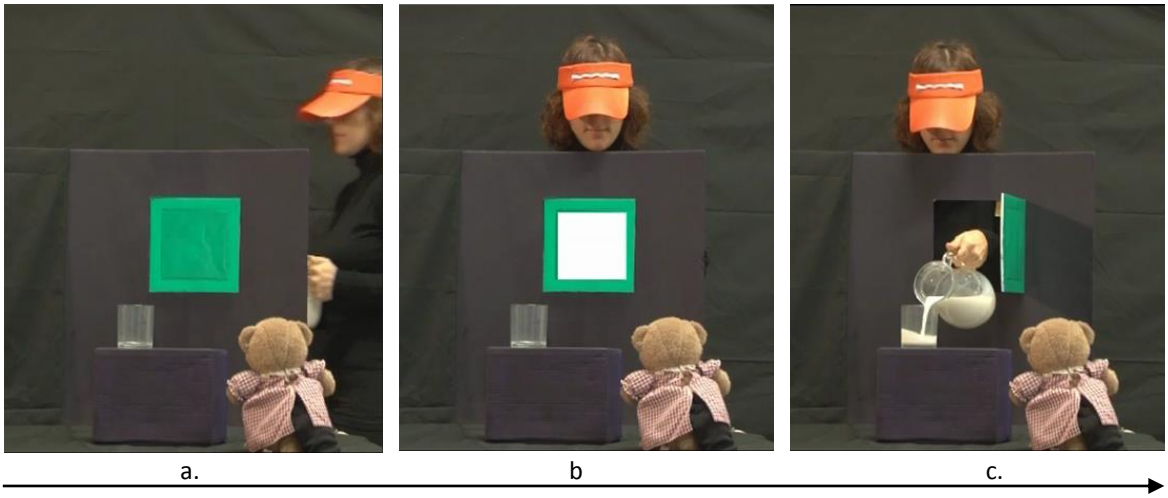

Figure 1. Video sequence of the familiarization phase; (a) picture showing the actor entering the scene while a bear observes; (b) picture showing the actor behind the window while the bear is looking at the illuminated window which simoultaneusly a chime rings; (c) picture showing the actor pouring a full glass of milk from the window right after the window was turned off.

The distribution phase consisted of four test trials, in each test trail, infants were presented with a distributive action in which a human agent or distributor (one of the two experimenters previously seen in the familiarization trials) poured some milk to two identical teddy bears (see Fig. 2), henceforth the 'recipients'. This time, the distributor carrying the milk went behind a panel with two green windows (Fig. 2a), one on the left and one on the right side of the panel. In front of the two windows there were two glasses and next to each glass a teddy bear. The moment the distributor arrived to the center of the panel both windows illuminated at the same time for three seconds, and a chime rang simultaneously (Fig. 2b). Immediately after, the distributor opened one

of the two windows (with one hand) and poured some milk into the glass in front of it (Equal distribution trials (E): half-full glass; Unequal distribution trials (U): full glass) (see Fig. 2c).

Afterwards, the windows illuminated again with a chime (Fig. 2d), only this time the milk was poured from the other window to the glass next to the other teddy bear (again 3 seconds) (see Fig. 2e). Once this action is finished, the distributor leaves the scene. In all trials, the distributor poured always the same total amount of milk but, depending on the trail type, the milk was either divided equally or very unequally (see final outcomes in Fig. 2f).

Finally, infants were presented with the images of the two agents (fair and unfair), one on the left and the other on the right of the monitor, to assess infant's *visual preferences* for one of the two agents.

Looking behavior analysis

We measured *Anticipatory looks* for the second distribution trial , and *looking times* for the final outcomes and for the visual preference. The anticipatory looks were recorded the moment the second time both windows lighted up. We analyzed which side infants expected the jug to exit by the first window infants looked at: do infants anticipate that some milk would be given to the teddy bear that had received none? After the second distribution of milk, the distributor left the scene. From this moment, looking times were coded until infants looked away from the scene for more than 2 consecutive seconds or 60 seconds elapsed. Infants were shown four test trials, two with equal distributions and two with unequal distributions. Trials were presented in two test orders (Test order 1: EUUE; Test order 2: UEEU). The same distributor (fair agent) always performed the equal distributions, while the unequal ones by the other distributor (unfair agent). Test order, the identity of the fair agent (the agent with the pink or orange visor), the side of entrance and the side of the first delivery were counterbalanced across participants.

Visual preference task

Infants when presented with the images of the two agents or actresses (fair and unfair) after the final trial, their visual preference for one of the two agents were recorded. The position of the fair and unfair distributors was counterbalanced across participants.

Manual choice task

After the end of the movies, a manual choice task was presented. Infants were shown two 7.3 x 5.5 cm polystyrene shapes with pictures of the distributors. These pictures were placed in front of the infant using a 32 x 21 cm white tray. Infants, after 5 seconds from the presentation of the two agents, were encouraged to choose one by the following verbal prompt: "Come on, pick one". In this way, the child could express her/his preference for the fair or unfair agent by touching or picking up the agent of her/his choice. Caregivers were instructed not to interfere with infants' choice. The side of the fair donor was the same as in the visual preference task. The inter-judges agreement was 100%.

3.2.2 Results

Anticipatory looks. For this measure we recorded the first anticipatory looks during the illumination of the windows preceding the second resource allocation. As can be seen in Table 1, infants who anticipated the second resource allocation did not show any significant bias in their anticipatory looks (two-choice binomial test, two tailed, all *p*s >. 63). In the first trial, 75% of infants (N = 24) anticipated the following resource allocation, $p = .007$, two-choice binomial test, two tailed. In addition, all tests on the association between the type of distribution (equal vs. unequal) and the side of the first anticipatory look were not significant (two-tailed Fisher's exact test, all *p*s > .2).

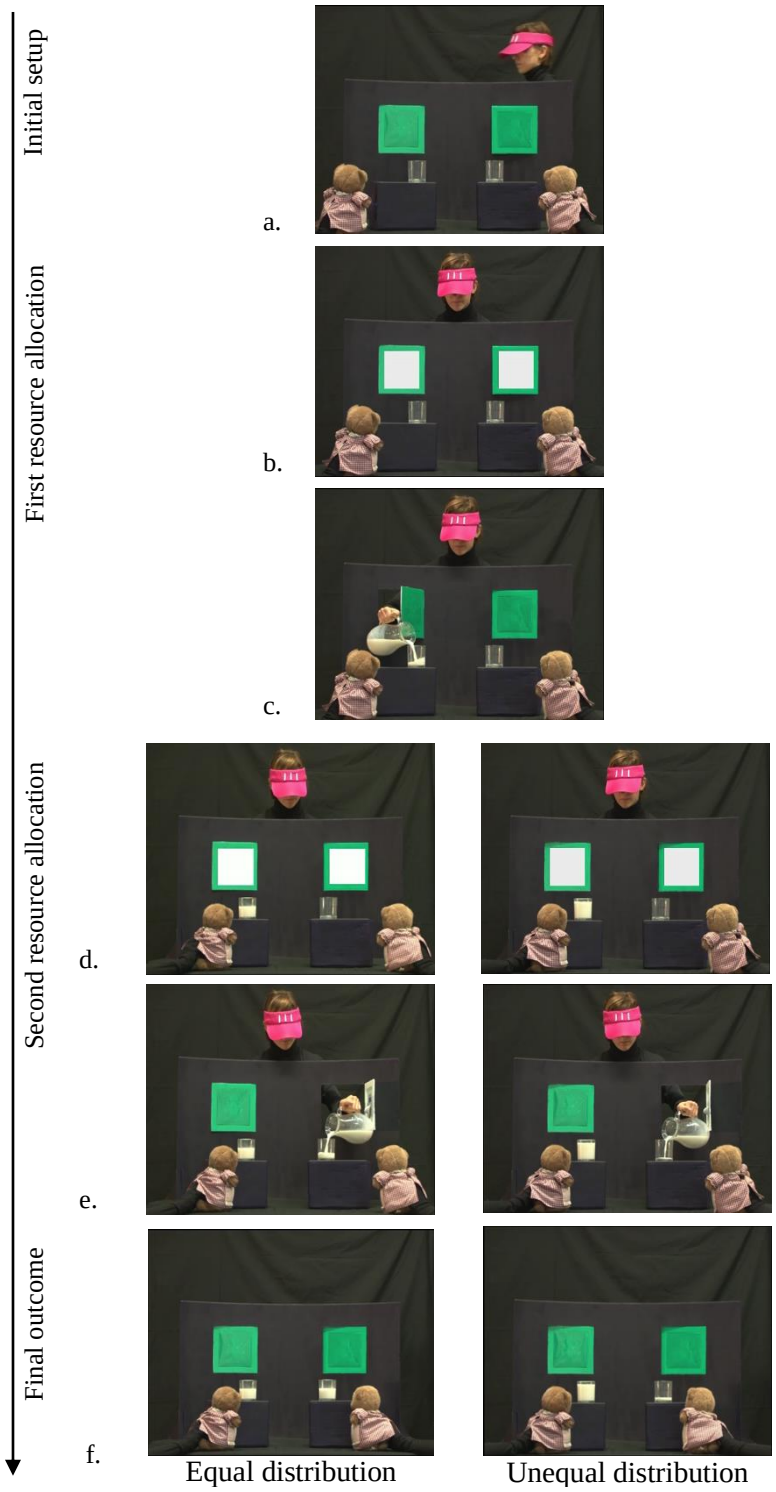

Figure 2. Video sequence of test trials in the distribution phase. (a) The agent enters the scene; (b) the two windows illuminated and, simoultaneusly, a chime rings; (c) the agent pours some milk into one of the glasses; in the equal distribution trails, the glass is half filled, while in the unequal distribution trials, the glass is fully filled; (d) the windows illuminates again; (e) the distributor pours some milk in the second glass; in the equal distribution trials the glass is half filled, while in the unequal distribution trials only a very small quantity of milk is poured in the second glass; (f) final outcomes of the distributive actions.

Table 1

First Anticipatory looks.

Trial	Distribution type	First anticipatory look		
		Empty glass	Filled glass	No anticipation
1	Equal (half full glass)	6	5	5
	Unequal (full glass)	7	6	3
2	Equal (half full glass)	4	7	5
	Unequal (full glass)	4	4	8
3	Equal (half full glass)	3	7	6
	Unequal (full glass)	7	4	5
4	Equal (half full glass)	4	6	6
	Unequal (full glass)	3	4	9

In addition, the average times infants spent looking at the windows during the illumination of the windows preceding the second resource allocation were compared. This analysis was conducted excluding 5 outliers. The time spent looking at the window above the filled glass (M = .19; SD = .26) was longer than that spent on the window above the empty glass (M = .09; SD = .10), $t(27) = 2.24$, $p = .033$, $\eta 2 = .16$ (Fig. 3). This result suggests that the presence of milk was an attractor that affected infants' preferences for one side of the visual field.

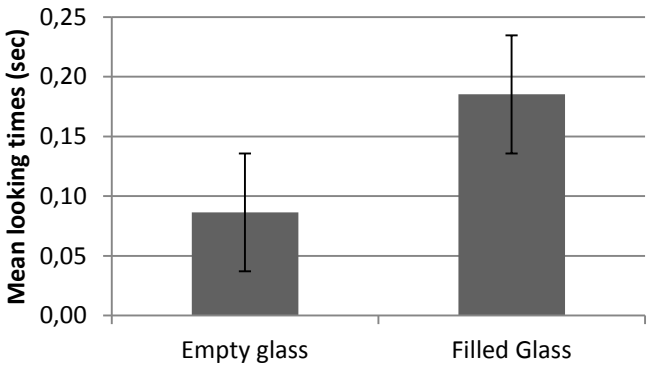

Figure 3. *Anticipatory looks.* Comparison between the average times infants spent looking at the windows above the empty vs. filled glass during the illumination of the windows preceding the second resource allocation.

Looking times. Considering the outcome of the equal and the unequal distributions, we were interested in analyzing if there was a difference in the mean time infants spent looking at both outcomes. No significant effect was found (p >.05). Similar results were obtained when 2 outliers were excluded because looking times more than 2 SD from the mean.

Visual preference task. In order to verify the existence of a preference for one of the two agents (fair *vs*. unfair) we compared the average time infants looked to one or the other. The analysis was conducted not considering the five outliers. No significant difference in the mean time spent looking at the (M = 2.84, SD = 1.73) or unfair (M = 2.93, SD = 2.09) donor was found, $t(27) = 0.35$, $p = 0.73$.

Manual choice task. The analysis on the explicit answers indicating a preference for the fair or unfair distributor did not show any significant effect (N = 16, fair distributor = 9, unfair distributor = 7, two-choice binomial test, two tailed, $p = .80$).

This study shows that the 11-month-olds do not anticipate a visually equal or unequal distribution of resources. This result seems to have been influenced by the visual elements of the scene (black / white contrast and attractiveness of milk) that, at this age, could be dominant over the early-sense of fairness. 11-month-olds have not even shown a post-dictive expectation with respect to the fairness of resource allocation. Since the sense of distributive justice is a skill that develops with age, we replicated the study with an older sample of infants.

3.3 Study 2

This study aims at investigating the expectation of a fair distribution in children of 15 months using the same experimental paradigm used with children 11 months of the previous study.

3.3.1 Method

3.3.1.1 Participants

Sixteen 15-month olds (6 females; mean age = 459.13 days, SD = 31.30; range = 408-509 days) were included in the study. Furthermore, 2 infants were excluded for fuzziness. Parents gave their written consent to the study.

3.3.1.2 Materials and procedure

See the "Materials and Procedure" part in Study 1.

3.3.2 Results

Anticipatory looks. First anticipatory looks during the illumination of the windows preceding the second resource allocation was also coded. Table 2 shows the number of infants who anticipated an equal or unequal resource allocation. No significant bias in the anticipatory looks of the infants who anticipated the distribution was found (two-choice binomial test, two tailed, all ps >. 15).

In the first and fourth trial 88% of the infants (N = 14) anticipated the resource allocation, $p = .004$, two-choice binomial test, two tailed. All tests on the association between the type of distribution (equal *vs*. unequal) and the side of the first anticipatory look were not significant (two-tailed Fisher's exact test, all *p*s > .2).

Table 2

First Anticipatory looks

Trial	Distribution type	First anticipatory look		
		Empty glass	Filled glass	No anticipation
1	Equal (half full glass)	4	2	2
	Unequal (full glass)	3	5	0
2	Equal (half full glass)	3	4	1
	Unequal (full glass)	0	5	3
3	Equal (half full glass)	1	2	5
	Unequal (full glass)	1	3	4
4	Equal (half full glass)	4	3	1
	Unequal (full glass)	4	3	1

Moreover, Infants spent more time looking at the window above the filled glass (M = 1.26; SD = .19) that on the above the empty glass (M = .58; SD = .59), $t(14) = 2.64$, $p = .02$, $\eta 2 = .33$ (Fig. 4). The analysis was conducted not considering the outlier. Once again, the attraction exerted by the milk and the visual contrast has captured infants' attention.

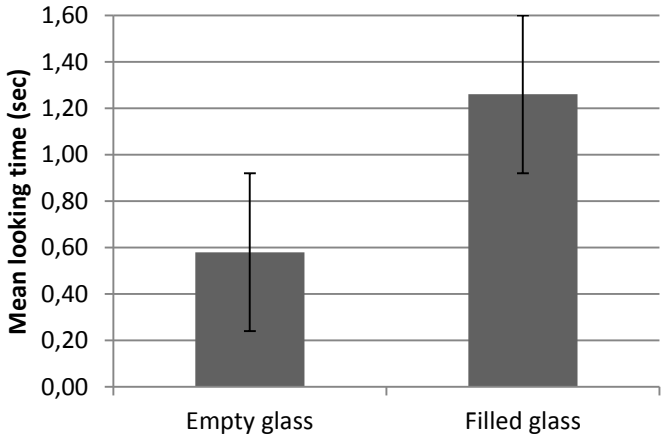

Figure 4. *Anticipatory looks.* Comparison between the average times infants spent looking at the windows above the empty vs. filled glass during the illumination of the windows preceding the second resource allocation.

Looking times. Infants looked at unequal distributions (M = 5.75; SD = 3.28) reliably longer than at equal distributions (M = 3.93; SD = 2.06), $t(14) = 3.0$, $p = .024$, $\eta 2 = .315$ (Fig. 5). One subject was not considered in the analysis because it was an outlier.

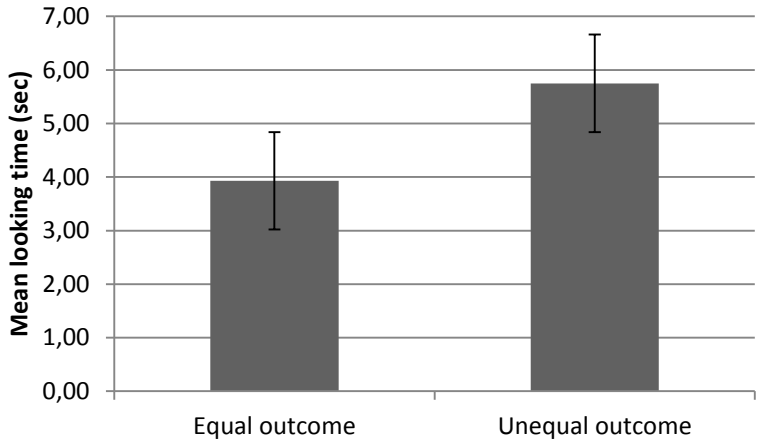

Figure 5. Mean looking times infants spent in the distribution outcomes (equal vs. unequal outcome).

Visual Preference task. No significant difference in the time infants spent on the fair or unfair distributor (p >.05). The same result was obtained also excluding the outlier.

Manual choice task. The analysis of the infants' answers indicating a preference for the fair or unfair distributor picking up one of the two agents did not show any significant effect (N = 11, fair distributor = 5, unfair distributor = 6, two-choice binomial test, two tailed, n.s.).

3.4 Discussion

This study was designed to investigate infants' sense of fairness in a resource allocation task of continuous resources. In line with previous works (Schmidt & Sommerville, 2011; Sommerville, et al., 2013), we found that 15-month-olds revealed to be able to evaluate agents and to have an expectation for equitable allocations of resources when observing the final outcome of test events. In fact, when this expectation was disregarded, infants spent more time observing the outcome of the distribution (i.e. followed the VOE paradigm). This expectation did not emerge with 11-month-olds.

Furthermore, infants of both ages did not look preferentially to one of the two illuminated windows showing no anticipation of the second resource allocation. Moreover, infants showed to be

sensible to the attraction exerted by the glass previously filled with milk suggesting that the presence of milk was an attractor that affected infants' preferences for one side of the visual field. Both age groups did not show any preference for the any of the actresses when visually or manually choosing between their images.

These findings are consistent with similar works that have also provided evidence that using an anticipatory looking measure to demonstrate children's expectations is not effective at this age (Geraci & Surian, 2011; Neira-Gutiérrez, Franchin, Savazzi, Surian, in prep.; Southgate et al., 2007). Even by making movies with a realistic setting, with a similar effective procedure that also used an anticipatory looking paradigm (Southgate et al., 2007), we still did not observe this type of behavior at this stage of development.

To investigate the developmental change, we could observe, with our sample of 11-month-olds and our sample of 15-month-olds who were tested with the same VOE paradigm, that the results of this study provides important information regarding the developmental trajectory of infants' fairness expectations. Considering 15-month-olds looked reliably longer to the unequal outcomes in the experimental condition of the VOE paradigm, 11-month-olds looked equally to both outcomes. These findings reveal that there are in fact age-related changes between 11- and 15-month in infants' expectations regarding how resources are typically distributed. Additionally, 15-month-old infants were more attentive to the outcomes in the VOE than 11-month-olds. We think that it is improbable that differences in infants' overall attention to the outcomes across age groups accounted for the observed differences in infants' looking preferences across ages for a few reasons. First, infants in both age groups were equally attentive to the distribution phase (attraction exerted by the glass previously filled with milk), revealing that both age groups were engaged in the task. Second, past work has suggested that infants discriminate test outcomes at 12 months in habituation paradigms when overall attention levels are equivalent (see Sommerville & Woodward, 2005).

Third, 11-month-old infants' overall attention to the final outcomes was unrelated to the degree of their preference for the unequal outcome, claiming that the effect is independent of infants' overall attention.

Do we have enough evidence that proves humans possess spontaneous evaluation skills that are applied to agents' distributive actions? Indeed, there has been a long line of evidence in recent years (Geraci & Surian, 2011; Hamlin, 2013; Meristo & Surian, 2013; Meristo & Surian, 2014; Schmidt & Sommerville, 2011; Sloane et al., 2012; Sommerville et al., 2013) that proves this point. We then can, once again provide supportive evidence that infants in their second year of life are able to evaluate distributive actions and present specific expectations for equitable allocations of resources. Our results, revealing an early idea of justice in the second year of life, are coherent with the recent theoretical models that supported the role of the biological equipment and the innate origin of moral sense (Hauser, 2006; Dupoux & Jacob, 2007). These theories claimed the moral sense derives from a 'universal moral grammar', which is based on innate knowledge characterized by some universal principles that guide moral judgments unconsciously and automatically (Hauser, 2006). And a 'moral faculty', that is based on moral instincts and automatic emotional reactions (Dupoux & Jacob, 2007).

In sum, our findings contribute to topics that have already been studied using resource allocation tasks revealing early moral intuitions.

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Chapter 4

How infants approach fair and unfair distributors: Do they prefer helping a fair distributor rather than an unfair one?

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(In preparation)

Abstract

In developmental psychology, the early development of prosocial behavior has become a broad topic. Previous studies revealed that the earliest instances of human helping behavior show specificity. In this study, we tested 20- and 30-month-olds to see whether after observing an equal and unequal resource allocation task there were differences in helping behaviors after observing a fair and an unfair resource allocation task. We found yet again that the human ability to engage in helping behaviors begins early in development; however, there is no evidence of a tendency by associating equal and unequal distributive actions with helping behaviors.

4.1 Introduction

Children begin to engage in pro-social behaviors in their second year of life (Dunfield & Kuhlmeier, 2010; Hamlin, Wynn, Bloom & Mahajan, 2011; Paulus, 2014; Warneken & Tomasello, 2007). Prosocial behavior is defined as the intervening, beneficial actions that are preceded by the direct observation or inference of another's negative state (Dunfield & Kuhlmeier, 2013; Dunfield, 2014; Warneken, 2013). These negative states include instrumental need (Instrumental need being when an individual is having difficulty finishing a goal-directed behavior such as retrieving an out of reach object, and another individual can interfere by helping), material desire (when an individual does not have a desired resource, e.i. toy or cookie, and another individual can interfere by sharing), and emotional distress (when an individual is experiencing a negative emotional state, and another individual can interfere by comforting). Helping and sharing have been the focus of most of the research work to date on prosocial behavior; in this study, particularly we will be studying children's helping intentions after an equal or unequal resource distribution task.

Recent scientific findings (Dunfield & Kuhlmeier, 2010; Schmidt & Sommerville, 2011; Warneken & Tomasello, 2006) made it possible to reveal how helping behaviors and the understanding of fairness in resource distributions, both in man and chimpanzees, seems to be influenced by some particular situations such as the presence of a previous positive interactions (Hamlin, Wynn and Bloom, 2007), the understanding of the difference between inability and unwillingness to provide (Behne, Carpenter, Call & Tomasello, 2005 as cited in Dunfield & Kuhlmeier, 2010).

A study conducted by Dunfield and Kuhlmeier (2010), where they observed in 21-month-olds the tendency to apply helping behaviors to someone as a result of a willing or an unwilling attempt to provide a toy. The aim of the study was to give more light to the nature and specificity of

the help provided by the children, in particular situations. They were presented with three different experimental situations, each of which is characterized by a difficulty, for example, when the falling of a toy impossible to recover for the two actresses who were behind a box, the two actresses simultaneously reached for the toy with outstretched arms, maintaining neutral expressions and not making eye contact with the participant. Infants were given an opportunity to retrieve the toy and give it to one of the actresses. Afterwards, the actresses expected the implementation of a helping behavior from the child, who, handed the toy to one of them, it did make a choice that was decoded as the preference for a type of behavior. The study found that children enact on helping behaviors, based mainly on experience and on the intentions of the person asking for help. Precisely for this purpose, in our work, we used a similar scenario, in which two actresses were distributing resources fairly (fair actress) or unfairly (unfair actress) and simultaneously asked to be helped with outstretched arms to pick up a ball. At the end of the scene, they finally offered the child two cookies, one for themselves and one to be delivered to an actress of their choice. In this way, it was possible to analyze the behavior of help in the delivery of the ball and the choice made by giving a gift in two different age groups. In addition to these two dependent variables, the influence of other variables on the choice made by children, such as sex, response times, the age of entry to the day-cares and the number of siblings was also analyzed.

In our study, we wanted to investigate whether there are differences in helping behaviors (delivery of ball and cookie) in children of two different age groups (20 months vs. 30 months), after observing a fair and an unfair resource allocation task. We expected to find a greater trend in manifesting helping behaviors and in giving awards to the fair distributor in the 30 months group. Some studies (Blake & Rand, 2010; Warneken, Lohse, Melis, Tomasello, 2011) claimed that the experience of socialization, the sharing and implementation of cooperative activities, have an influence on the implementation of collaborative behavior and help, so it is possible that the older

children, having lived probably more socialization experiences in the day-cares, manifest stronger helping behaviors and favor the fair distributor than younger children. It is also assumed that the 'number of brothers', 'age of enrollment to the day-cares' and 'sex' influence the choices made by the children.

In particular, the greater the number of brothers and the lower the age of enrollment to the day-cares, the more frequent helping behaviors and awards should be given out to fair distributors, since it can be assumed that the presence of brothers and an early enrollment to the day-cares take the child to have more socialization experiences and then be more exposed to helping and awarding behaviors. Finally, we expected that there may be a difference between girls' and boys' behaviors, since in literature girls seem to base their judgment on aspects most spontaneous and empathetic than boys that are mainly based on rights and duties (i.e., Gilligan, 1982).

4.2 Method

4.2.1 Participants

The experiment was conducted with 41 children enrolled in private and public day-cares in the province of Trento, mostly Italians, divided into two experimental groups according to age and homogeneous with respect to the variable gender. 17 children were excluded from the study, 4 by procedural errors and 13 because they did not complete the required task.

The first group consisted of 19 children aged between 18 and 25 months (M = 20:16; SD = 1.80), the '20 months' group. The 47.4% (9) were males mostly Italians (94.7%) and a majority (55.6%) were inserted to the day-cares between 16 and 18 months. In addition, it was also found to contain a family of brothers, 7 of them are only children, 10 have a brother and only 2 (10.5%) have two or more siblings. The second group consisted of 22 children aged between 27 and 32 months

(M = 29.45; SD = 1.74), the ‘30 months’ group. 45.5% (10) males are mostly Italian (86.4%) and most of them (68.1%) were inserted to the day-cares between 10 and 15 months. In addition, it was also found to contain a family of brothers: 5 of them are only children, 11 have a brother and 6 (27.3%) have two or more siblings.

Participants were contacted in different day-cares of the town of Rovereto. Parents of children were given a letter of presentation of the study, which explained the procedure and purpose of the research, and a written consent form for the processing of sensitive data.

4.2.2 Materials

We modeled our procedure around the work conducted by Dunfield and Kuhlmeier (2010). The experimental apparatus (see Fig. 1) consisted of two cardboard boxes (33 x 77.5 x 31 cm) covered by a black sticky paper, elevated from the ground with three triangular shaped wooden pieces (9 x 30 cm) that helped tilt the boxes, making the setting more visible to the child who had to sit at the front center at a distance of 80 cm on the legs of their teacher. A red pillow (42 x 42 x 5 cm) was used to indicate the exact point where they had to sit. The perimeter of the two boxes was bordered by a strip of white color to define the specific space for each actor, and each box had two small openings on the inclined upper part (8 x 11.5 cm), 11.5 cm away from the perimeter, where two incorporated dolls were present. Under each doll a wooden stick (2 x 20 x 1.5 cm) was applied to reach a height of 4.5cm, that is 5 cm from the perimeter of the box, to help support the resources that were being distributed, so that these remain visible throughout the test events.

Figure 1. Image of the experimental setting

The boxes were positioned by joining the interior front angles, so it is slightly rotated towards the child. The resources were distributed to four identical fabric dolls (26 x 19 x 11.5 cm), two for each actress. The resources were four cookies (3.5 x 8 x 0.5 cm) and four candies (3.5 x 7.5 cm). The ball used (9 cm diameter) was coated with a soft and colorful leather like material, and did not bounce. Children were also videotaped using two video cameras (Panasonic SDR-H20, Sony handycam DCR-HC27E), one in front and one behind the child and two tripod stands (Manfrotto, h 50 cm).

4.2.3 Procedure

The experiment was carried out in an environment familiar to the child, usually in a quiet room of the day-care, where the experimental apparatus was set up. All the people involved were: 1) Experimenter: introducing the child to the experimental scenario, 2) 'Fair' actress 'Unfair' actress: they carried out the distribution of resources, 3) Teacher or educator: held the child in their arms, 4) Child: watched and carried out choices.

After an initial greeting an habituation phase was carried out, in which the experimenter familiarized the teacher with the procedure and their role. The child was presented with a short game conducted by the experimenter: all the people involved sat in a circle and passed the colorful ball either clockwise or counterclockwise; the role of the two actresses in the game was similar but secondary to that of the experimenter, without interacting directly, so there was no influence in their choice during the distribution phase. After finishing the game, the two actresses are positioned to one side, usually behind the child for not being noticed. Testing began after switching on the cameras that reflected the scene at the front and back of the child.

Testing events consisted of three phases, familiarization phase, distribution phase and experimental phase. The familiarization phase started with the experimenter positioned behind the two cardboard boxes centrally, she presented the four dolls holding them in a hand and simulating an interaction between them, later placing them in the openings of the boxes facing the child. The dolls were presented two at a time as sisters, the experimenter explained: "These are two sisters, Chiara and Silvia. Hello Chiara!, hello Silvia! watch how they play together "; "These are two sisters, Clara and Sara. Hello Clara!, hello Sara! watch how they play together ". After finishing the positioning of the dolls in the openings, the experimenter played toss with the colored ball for a few seconds, tossing it upwards two times, saying "And now again the colored ball!" and making it accidentally fall in front of the child. Subsequently, she reached for the ball as if to pick it up, moving her fingers as sign of wanting to grab the ball, and asked the child: "Oh no! Help me. I dropped the ball, can you help me? ". In order to assist the child, the experimenter turned the palm upwards. Once the ball was returned to the experimenter, she thanked the child and hid the ball behind the scene, announcing the entry of the two actresses: "Now, mothers of these sisters play with us".

While the actresses are positioned centrally behind the two boxes, the experimenter moved away from the scene, and stood behind the teacher, in order to hide from the child, this marked the beginning of the distribution phase. Each actress before starting their respective distributions rotated the dolls so that the faces were directed towards them so that the interaction during distributions proves as real. The distribution of resources (cookies and candies) occurred after the familiarization phase, where, in the case of an equal distribution, the actress said: "Hello girls, (actress addressing to the dolls) I have two cookies what do I do with them? (Both cookies were placed at the center of the box, easily visible to the child) This cookie I give to you and this other cookie I give to you (the actress kept eye contact with dolls, and the cookies were placed above the wooden stick placed on the box, so that the child could always observe how the distribution happened)"; In the case of an unfair distribution the actress said: " Hello girls, (actress addressing to the dolls) I have two cookies what do I do with them? This cookie I give to you and this other cookie again to you (the actress distributed both resources to one doll only), and to you nothing! (actress referring to the doll that had not received a cookie to mark the difference)". The same dialogue was used for candies, omitting the initial greeting. The position of the actresses, the type of distribution and the order of presentation was all counterbalanced across participants. At the end of all distributions (for a total of four), the resources were dropped into the small opening of the box where dolls were positioned, so they were not visible to the child anymore.

Subsequently both actresses rotated, so as to be opposite one another, and the last actress to carry out the fourth distribution took the colored ball, used in the familiarization phase, initiating an exchange of tosses between both actresses, this marked the beginning of the experimental phase. This moment was introduced by a dialogue between both actresses: "And now we play together?" (speaking simultaneously) Actresses tossed the ball 4 times to each other and at the same time said, "and that's enough! This we put it here!". Together they placed the ball in the middle of both boxes

and drop it, making it seem as if it was an accident and said: " Oh no! Help us!" (see Fig. 2). The actresses looks were directed to the ball, avoiding eye contact with the child, having a neutral expression and carrying out simultaneously an attempt to reach for the ball, keeping a distance of about 30 cm from the ball, in order to not influence the choice of the child. Only when the child held the ball, both actresses could extend the hand forward, and turn their palm upwards, as to indicate, nonverbally, where the child has to deliver.

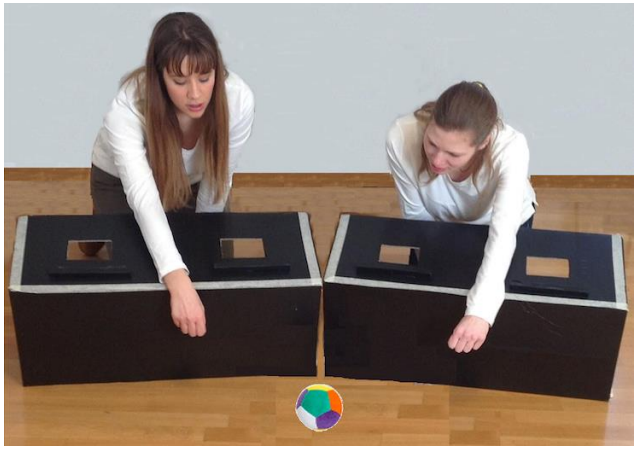

Figure 2. Example of scene after actresses tossed each other the ball. The ball subsequently fell to the floor. The two actresses simultaneously reached for the toy with outstretched arms, maintaining neutral expressions and not making eye contact with the participant. Infants were given an opportunity to retrieve the toy and give it to one of the actresses.

Once the child delivered the ball, the actress who received the ball hid it behind the box, meanwhile the experimenter walked next to the child and delivered two cookies, one by one, saying: "Now this is for you and this other cookie to whom would you give it to? To her or to her?". When the experimenter asked "to her or to her" the two actresses who are still behind the boxes, held out their arms and turn their palm upwards again, always without having any eye contact with the child. In the event that the child does not take part voluntarily, the educator was asked to help out, always without indicating any of the actresses: "Help them! Help them catch the ball!", or "To who would you give the cookie to. To her or her? ", and also by helping the child to get up to catch the ball or hand over the cookie. After the child handed the cookie to one of the two actresses, the distribution phase had ended and the cameras were turned off.

4.3 Results

Given the small sample size we opted for a set of non-parametric analysis to describe the characteristics of the two groups of participants (20 months vs. 30 months). To verify the differences between the two groups of children (N = 41), a number of statistical tests on the median and means were performed. The comparison between children of 20 months and those of 30 months in relation to the delivery of the ball against the actress who performs a fair distribution or the actress who performs an unfair distribution was not significant (Mann -Whitney, U = 202, z = -.213, p = .831, r = .03).

Unlike the previous data related to the delivery of the ball task, the comparison between children of 20 months and those of 30 months in relation to the delivery of the cookie was significant between the actress who performs a fair distribution and the actress who performs an unfair distribution (see Fig. 3), (Mann-Whitney U = 126, z = -2.35, p = .019, r = .37). This significance is also supported by an effect size of moderate amplitude. 20-month-olds seem to choose more consistently the actress that made a fair distribution of resources, compared to older children that did not differ in choice. The presence of this data leads to assume that the child has attributed a different importance to both tasks (ball delivery and cookie delivery) as the first was on providing help in a difficult situation, and the second was to reward spontaneously one of two actresses by giving them a cookie.

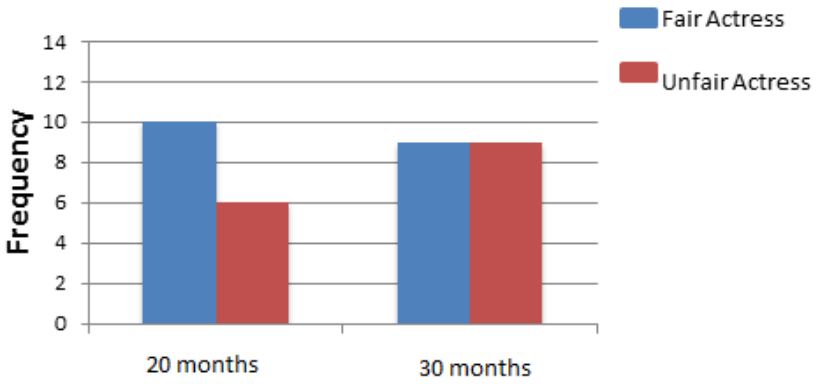

Figure 3. The graph shows the distribution of 20 and 30 months old children when delivering the cookie to actresses who carried out a fair or unfair distribution of resources.

The time spent by children in delivering the ball and cookie was also analyzed. The two groups of participants, were compared to response times of the two tasks, the delivery of the ball and cookie differ in response time to the first task, the delivery of the ball (U = 92.5, z = -3,054, p = .002, r = .48), However, in the delivery of the cookie there was no significant difference (U = 135.5, z = -1,465, p = .143, r = .22). Older children are quicker to respond to stimuli with an effect size close to the threshold of .50, this indicates a large effect. Note that the 20 months group take more time in the first task, which is drastically reduced in the second. This data, although not statistically significant, shows a learning effect in task participation; especially it shows an increase in the children's response behavior because they, in terms of time, seem less inhibited in the second task to approach the actresses with respect to the first task.

Furthermore, both age groups differ significantly in the age of enrollment to the day-cares (U = 110.5, W = 363.5, z = -2,586, p = .010, r = 0:40). The 30-month-olds, as seen in Figure 4, joined the day-cares at an earlier age than the 20-month-olds (the median age the younger age group enrolled to the day-cares was 16 months, while the median of the older age group was 12 months). Also in this case the amplitude of the effect is moderate.

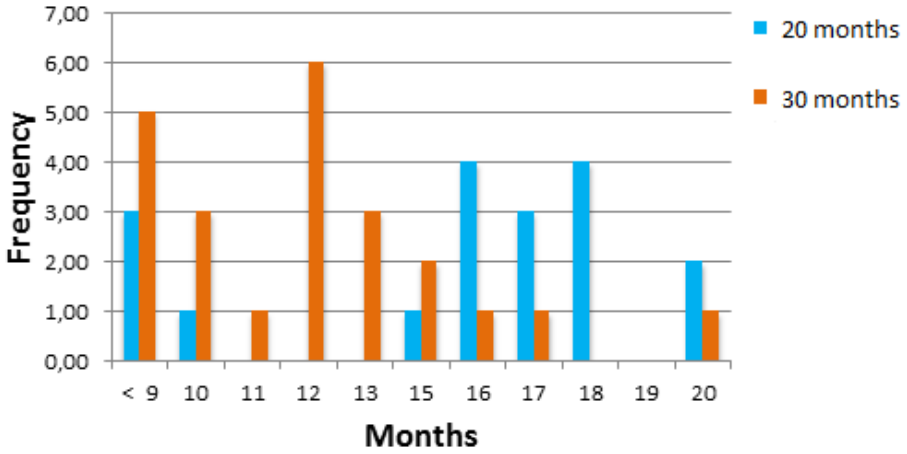

Figure 4. The graph shows the distribution of frequencies of the two experimental groups according to the age in which they enrolled to the day-cares.

We calculated zero-order correlations for variables of experimental interest (delivery of the ball to the actress carrying out a fair distribution, delivery of the cookie to actress carrying out a fair distribution, gender, age of enrollment to the day-cares, number of brothers or sisters). As seen on Table 1, the variables analyzed are not significantly correlated (p <.05). Specifically, the delivery of the ball to fair actress is not significantly correlated with either gender, nor with the age of enrollment to the day-care or with the number of siblings (see column 1). In Table 2, it is possible to observe the presence of a significant correlation (p <.05). Specifically, the delivery of the cookie to the fair actress is negatively correlated with the age of enrollment to the day-care (tau = -.212, p <.05). There was no indication of any influence of the variable "Sex" on the variables investigated as can be seen, both in Table 1 and in Table 2, Line 2.

Table 1

Correlations between independent variables and the dependent variable "Delivery of ball to fair actress".

Non-parametric correlations				
		1	2	3
1	Delivery of ball to fair actress	1.000		
2	Sex	.034	1.000	
3	Age of enrollment	-.062	-.157	1.000
4	Number of brothers and sisters	-.147	-.192	.014

*Note: N = 41; Kendall's tau_b ; Degrees of freedom = 39; * = p < .05.*

Table 2

Correlations between independent variables and the dependent variable "Delivery of cookie to fair actress

Non-parametric correlations				
		1	2	3
1	Delivery of cookie to fair actress	1.000		
2	Sex	.106	1.000	
3	Age of enrollment	-.212*	-.157	1.000
4	Number of brothers and sisters	.059	-.192	.14

*Note: N = 41;Kendall's tau_b ; Degrees of freedom= 39; * = p < .05.*

For further analysis, we have the following results on a possible similarity in the delivery of the ball and the delivery of the cookie (see Fig. 5). From the original 41 subjects, 7 were excluded because they had not completed the task, or because they delivered both cookies to both actresses (n = 4), for a total of 34 subjects. We observed which actress children had the tendency to deliver the resources and if they showed a certain consistency in the delivery, or if by having delivered the ball to the actress who had made the fair distribution tended to give her two cookies. The results showed

that 20-month-olds showed a significant consistency in carrying out the delivery of resources (χ^2 (2) = 3.85, p = .05; Cohen's d = .70), compared with the group of 30-month-olds; the d of Cohen indicates a strong effect for both groups, while the value of p is significant to the limit. Younger children, therefore, delivered and gave the resources to the same actress, carrying out a distribution such as "delivery of the ball to Fair actress – delivery of cookie to Fair actress" or "delivery of the ball to Unfair actress – delivery of the cookie to Unfair actress". The delivery of resources by children of 20 months is, therefore, independent of the type of distribution that the actresses exhibited. Unlike the 20-month-olds, the 30-month-olds tended to evenly distribute available resources between the two actresses: if the first resource was delivered to the actress who had done a fair or unfair distribution, the second resource was delivered to the actress who had not received anything in the first part of the task.

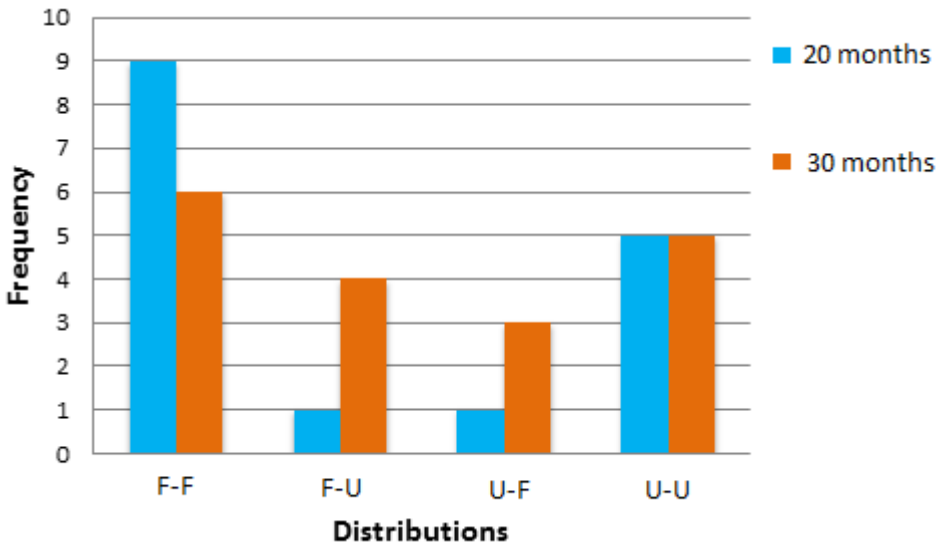

Figure 5. The graph represents the distribution of frequencies of the delivery of the ball and cookie conducted by 20-month-olds and 30-month-olds, depending on the type of distribution performed by the actresses. Each index consists of two acronyms: the first one is related to the delivery of the ball to the actress who made a fair (F) or unfair (U) distribution, while the second refers to the delivery of the cookie actress who carried out one of two types of distribution.

4.4 Discussion

The results of this study do not confirm the experimental hypotheses initially proposed by us. Specifically, we did not find any behavioral difference between the two age groups, both in the helping task or in the giving a resource task after observing a resource allocation task (2 types: equal and unequal distributions). One possible interpretation for these results may be because children do not use the criteria of choice suggested by us, also along with the fact that the task assigned to them may be complex for the way in which it was presented. In fact, children in both age groups, provided the helping behavior requested by the actresses to recover the ball, showing an effective capacity to manifest this behavior from 18 months as confirmed by some studies in literature (Dunfield, Kuhlmeier, O'Connell, Kelley, 2011; Warneken & Tomasello, 2006). The aspect that, for various reasons, is not fully understood concerns the second part of the task or the delivery of the resource to the actress who did a fair distribution. It is probable that by asking children to make a choice or deliver a cookie based on preference for an equal distribution of resources is a task too difficult to acquire (Kuhlmeier, Dunfield, O'Neill, 2014). One possible reason that this study did not find evidence for preferential choice of an equal distribution of resources in these particular age groups is simply that these children did not understand the social interaction that was enacted, and thus could not form an evaluation on which to base their selectivity. Another consideration about the explanation of our results concerns a procedural aspect, specifically the moment when the actresses conclude the distribution of resources and begin the game with the ball. We have reflected on the possibility that the introduction of this new task distracts children from the previous scenarios or the distributive actions conducted by the actresses towards the dolls. Children, therefore, in providing the help required by the actresses, that is to deliver the ball, does not seem to take into account the previous distributions, where the situation

was the final distribution of type 2: 2 (equal distribution) and 4: 0 (unequal distribution), confirming the idea that the criteria of choice used by the child for the delivery of the ball was random.

Which motivations may play a role in early prosociality? Empathic responding is the option most commonly discussed. Although, in studies where 1-year-olds show helping behaviors in situations where no emotional emotion is displayed (Warneken & Tomasello, 2006), and evidence of neural correlates associated with emotion-based processes are not associated with helping behaviors (Paulus, Gillis, Li, Moore, 2013), this description seems questionable in the case of helping. However, there is evidence for affect sharing and emotional contagion in infants. Consequently, it is possible that early comforting is based on emotional contagion and, at least to some extent or in some cultures, supported by empathic concern (Decety & Svetlova, 2012). With regard to helping, the situation is less clear. Given that helping is not based on any emotional expression of the other and is presented before the person being helped recognizes their need themselves (Warneken, 2013), empathic concern is less probable to be the motivating factor. This reveals that processes of goal alignment (Kenward & Gredebäck, 2013) or a motivation to engage with another may play a role in the emergence of helping.

Interestingly, in the experimental phase, 20-month-olds tend to deliver the cookie at the same actress, regardless of the type of distribution that she presents; 30-month-olds instead tend to even out the distribution so that each of the two actresses receive at least one resource. The behavior performed by the 30-month-olds can be explained by the evolution of the sense of fairness and justice. In literature, the presence of the emerging sense of fairness and justice in infants is widely studied in developmental psychology (Geraci & Surian, 2011; Hamlin, 2013; Sloane, Baillargeon, Premack, 2012; Sommerville, Schmidt, Yun & Burns, 2013). Considering, as a limitation of our study, the limited involvement by the participant to the distributive actions, we see how actively the

child makes a fair distribution of resources to the two actresses, confirming even more effective the early development of a sense of fairness.

In conclusion, given the present results and those from other studies, it is clear that the human ability to engage in helping behaviors begins early in development. Additionally, we understood that it might be distracting for children to relate to what was taking place on the resource allocation task, to form an evaluation on which to base their selectivity for a helping behavior. For this reason, our findings suggest that there is no sign of a tendency by associating equal and unequal distributive actions with helping behaviors yet at 30 months of age.

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Chapter 5

Do infants map the word 'good' to moral qualities?

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(Submitted)

Abstract

We report 20- and 30-months-olds' knowledge of the word 'good' in the two core domains of moral reasoning: fairness and harm. Previous literature reveals infants' sensibility to these two domains in the first year of life; however, no other study has investigated whether infants' emerging moral competence is also mapped early onto an appropriate lexical item in the second year of life. We studied infants' manual choice responses towards agents that perform fair/helping actions or unfair/hindering actions. Our results provide evidence that even if there is an already established emerging sense of fairness and harm in 20-month-old infants, these concepts are not yet correctly mapped at a linguistic level until 30 months for the harm domain, and later for the fairness domain.

5.1 Introduction

'Good' is an interesting word that is used in a variety of contexts. It is the most general term of approval and it is used as an adjective, a noun, an interjection, and an adverb. Thus, there will be lexical readings for each of these types of occurrence (Katz, 1964). This famous author in the philosophy of language also wrote that: “Whereas the meaning of a word such as 'bachelor', 'honest', 'hard', 'cuts', 'liquid', etc. is made up of component elements that are attributes in their own right, the meaning of 'good' is a function that operates on other meanings, not an independent attribute. Apart from combination with the conceptual content of other words and expressions, the meaning of 'good' does not make sense. Since the meaning of 'good' cannot stand alone as a complete concept, we shall say that the meaning of 'good' is syncategorematic” (p. 763).

Concurrent with this lexical complexity, the word 'good' is also a word highly heard and easy to learn by children (e.g., “You are a good boy!”, “Good job!”, “Is the food good?”). By 24 months, most children use a number of adjectives in their everyday speech and appear to understand that, in so doing, they are referring to the properties of things (Mintz & Gleitman, 2002). Between 18 and 20 months, children first produce word combinations as a “telegraphic speech”. Before they can produce many words, children acquire a significant comprehension vocabulary (Benedict, 1979; Fenson, Dale, Reznick, Bates, Thal, & Pethick, 1994; Friedlander, 1970; Hutternlocher, 1974; Shipley, Smith, & Gleitman, 1969). So, there is an asynchrony across two different linguistic domains that involves comprehension and production. For example, Benedict (1979) reported that 14-month-olds’ spoken vocabulary size is only 10 words, while their comprehension vocabulary seems to be 50 words, as reported by their parents. Furthermore, the ability to learn arbitrary association between words and objects appears to develop rapidly at about 14 months of age (Werker, Cohen, Lloyd, Casasola, & Stager, 1998).

Therefore, the second year of life seems to be a critical period to investigate the evolution of infants' appreciation of the links between words and the world (Booth & Waxman, 2003), and their growing capacity to map the words appropriately to meaning in different domains. Furthermore, the second year of life seems to be crucial also for the moral development. Infants display an ability to evaluate agents by taking into account their fairness in distributive actions (e.g., Geraci & Surian, 2011; Meristo & Surian, 2013) and they are also able to attribute positive values to helping actions and negative values to hindering actions (Hamlin, Wynn, & Bloom, 2007; Kuhlmeier, Wynn, & Bloom, 2003).

By using implicit non-verbal measures such as looking times and preferential reaching, some recent studies suggest a sense of fairness in infants aged between 16 and 21 months. It was shown that during the second year of life, infants expect goods and resources to be allocated equally to recipients, they prefer agents that perform fair/equal distributions, and expect other agents to affiliate with or approach fair over unfair distributors (Geraci & Surian, 2011; Schmidt & Sommerville, 2011; Sloane, Baillargeon, & Premack, 2012; Sommerville, Schmidt, Yun, & Burns, 2013). That is, infants' reactions towards distributing agents differed as a function of the action performed by the previous fair/unfair agents' distributions.

Geraci and Surian (2011) showed infants aged 12 to 18 months two distributive puppets (a lion and a bear), two receiver puppets (a donkey and a cow) and an observer (a chicken). One distributive puppet gave each receiver one multicolor disk, the other gave one receiver two disks and the other receiver nothing. With a manual choice test, the authors demonstrated a significant tendency to pick up the fair rather than the unfair distributor. Schmidt and Sommerville (2011) in a similar way, but using actual people instead of animal puppets, showed that fifteen-month-old infants looked longer at the unfair distribution, suggesting that infants found this division

unexpected.

Furthermore, Meristo and Surian (2013) found that at 10 months this moral evaluation is used when infants subsequently consider the likelihood of another agent approaching the distributor. Infants expect third parties to act positively towards fair donors who have distributed attractive resources equally between two recipients, rather than toward unfair donors who made unequal distributions. Infants looked longer when a reward was given to an unfair agent than when the same reward was given to a fair agent.

Infants' early social evaluations on helping and hindering behaviors, Hamlin et al. (2007) showed that infants as young as 10 months, after observing a wooden square helping a circle to reach the top of a hill and a triangle hindering the circle's climb, reach or prefer the helping agent.

Similar results were found also by Hamlin, Wynn, Bloom and Mahajan in 2011. The authors showed 8-month-old infants short events with helping or hindering puppets. Then, infants saw a new puppet who acted prosocially, i.e. giving a ball, or antisocially, i.e. taking away the ball, towards the helping and hindering puppet. Infants selectively preferred the puppet who acted positively toward prosocial individuals and the puppet who acted negatively towards antisocial individuals.

Together, all these studies suggest that infants are sensitive to a tacit principle of fairness in distributive actions and to helping behaviors, sustaining that evaluative processes that support later selective prosociality are present just within the first year of life.

What about the word 'good' itself? As mentioned in the beginning of the introduction, it is a general term for approval. What is interesting from the point of view of moral development, is that children start to apply the word 'good' to actions that have moral significance, such as fairness,

alongside other uses that are self-serving, such as something being pleasurable or tasting good. In abstract, there are several different meanings for the word 'good', or different senses of how it can be used. Philosophers have discussed this issue in the past, although they are mostly interested in the definition of the moral concept of good specifically (e.g. Korsgaard, 1983; Moore, 1903; von Wright, 1963), and substantial normative issues, such as how to give criteria for what counts as good for a given person, what does one's wellbeing consists of (e.g. Railton, 2003; Rosati, 1996; Sarch, 2011).

Defining the concept of moral good, philosophers usually stress the clear difference between genuinely moral good (as a normative, evaluative judgment) in contrast to something being instrumentally good. Moral good is a species of good of its own kind. Moore (1903) argued that even if we agree on what kind of things we should consider morally good, such as pleasure and wellbeing, we cannot define moral goodness as pleasure of wellbeing. Instead, we evaluate pleasure and wellbeing to be morally good. Philosophers usually agree on this. Hare (1952), for example, makes a sharp distinction between describing properties of something we think is good that make it good for us (e.g. 'this strawberry tastes sweet') and evaluating something good (e.g. 'this strawberry is good'). He also distinguishes between instrumental and intrinsic good. Instrumentally good is something that is good because it has a use for achieving something else (e.g. pleasure), but intrinsic good is good in itself. Moral good is always intrinsic. Moreover, naturalistic properties like sweetness cannot be used for moral evaluation, only morally relevant properties can, and this depends on what kind of moral theory one adopts.

Von Wright (1963) goes even further and analyzes a variety of different concepts of good. Interestingly, he does not make moral good its own category. His categories of good include such forms of goodness as instrumental goodness (e.g. 'this is a good knife'), technical goodness (e.g.

someone being good at something), utilitarian goodness (something being useful), which includes being beneficial (being good for someone), medical goodness (being in good health), and hedonic goodness (e.g. ‘a good strawberry’). He also includes some related notions that we do not call ‘good’, such as happiness, which means, for von Wright, being satisfied with one’s life as a whole. What makes something morally good for von Wright is intention. It is not enough that action has good consequences in any of the above sense. The action is good if the agent acts for the good of the other person, in any sense of the word, and this is intended without any alternative motives or harm. (See also Toppinen, 2013.)

If philosophers are right about the distinctness of moral good and other senses of the word ‘good’, then it has consequences for empirical studies on morality, too. The main consequence is that we cannot have an empirical theory of what moral good consists of, but maybe we can have an empirical theory of why people judge things to be good (Joyce, 2004). However, for the study at hand, the consequence is mainly positive. If moral good is its own category and not derivative from any instrumental sense of good that is self-serving, then the child’s tendency to apply the word ‘good’ to the kind actions that we evaluate moral, has to be a sign of an innate tendency to evaluate actions good or bad on the basis of interest in morality in specific. Therefore, if we discover that children are capable of attaching the word ‘good’ to actions that are targeted to others and have morally significant properties, such as fairness or harm, we have significant evidence for innateness of morality.

On the basis of this theoretical background, the aim of the present study is to investigate 20 and 30-months-olds’ knowledge of the word 'good' in the two core domains of moral reasoning: fairness and harm. Established that infants are sensible to these two domains just in the first year of life, we want to investigate whether infants’ emerging moral competence is also mapped early onto

an appropriate lexical item in the second year of life, when infants have a good comprehension of vocabulary.

Infants' knowledge of the word 'good' was tested in the domain of fairness at 20 months of age (Experiments 1 and 2) and at 30 months of age (Experiment 5). Infants were exposed to live events in which an experimenter introduced infants to two teddy-bear families. Infants' manual choice responses towards agents that perform fair or unfair distributions were analyzed.

Infants' knowledge of the word 'good' was tested in the domain of harm at 20 months of age (Experiment 3) and at 30 months of age (Experiment 6). Infants were presented with helping and hindering events with the same procedure described by Hamlin et al. (2004). Infants' manual choice responses towards the helper and the hinderer agents were analyzed.

Finally, 20-months-old infants were also tested for their knowledge of the word 'good' in the domain of food, as a control study. Our hypotheses were that: 1) if infants are able at 20 months or later at 30 months to generalize and associate a single term with different contexts, they are able to correctly link the term 'good' with the fair and helping behaviors, and that 2) already at 20 months infants know the word 'good', and they correctly associate the term to the food, because the use of this adjective is very usual in this context rather than in the other two domains.

5.2 Experiment 1

In this experiment we investigated 20-months-olds' knowledge of the word 'good' in the domain of fairness. Previous research showed that in the second year of life infants prefer agents that distribute resources fairly rather than agents that distribute resources unfairly (e.g., Geraci & Surian, 2011; Meristo & Surian, 2013; Schmidt & Sommerville, 2011; Sloane et al., 2012; Sommerville, et al., 2013). If infants' moral competence is mapped at this age onto an appropriate

lexical item, we hypothesize that infants are selectively oriented towards the fair distributor when the task is to pick up the good one. In the contrary case, the hypothesis is that infants are not selectively oriented to neither of the two agents.

5.2.1 Method

5.2.1.1 Participants

A group of 23 healthy full-term infants of 20 months of age (11 females, M_{age} = 20 months, 26 days, age range: 17 months, 29 days to 24 months, 4 days) were recruited at local public and private nurseries of Trento, Italy. Seven additional infants were excluded from the study because they refused to participate.

Infants were tested in a quiet room of the nurseries, only after their parents had given the informed consent. The entire research protocol was approved by the departmental ethic committee and was conducted in accordance to the principles elucidated in the Declaration of Helsinki.

5.2.1.2 Stimuli and procedure

Infants sat on an educator's lap in a quiet room of the nursery. An experimenter kneeled in front of the infant introduced him/her to two teddy-bear families, each one composed by a bear-mother and two cubs (see Figure 1a, b). The two families were differentiated by a bow tied around the neck: one family had a green bow and the other had a blue blow. The two bear-mothers were approximately 40 cm high, while the four cubs were 25 cm high. All the bears were hidden inside a black rigid bag.

Figure 1 a. The two teddy-bear families.

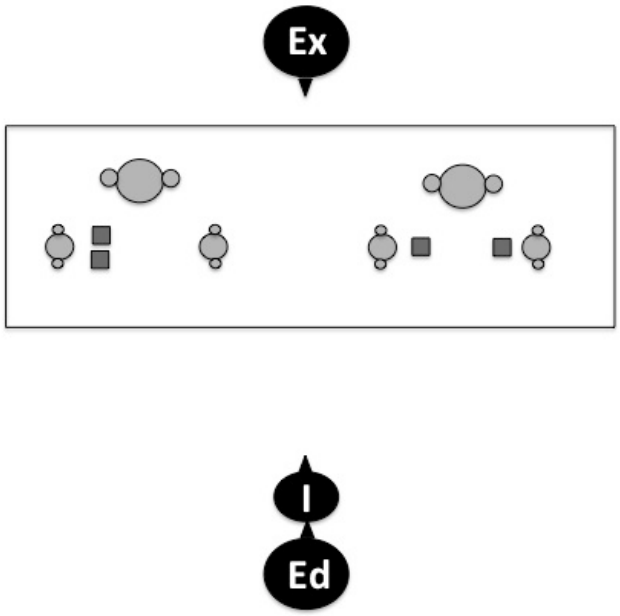

Figure 1 b. The experimental setting: the two teddy-bear families and the two different distributions of biscuits. Ex = Experimenter, I = Infant, Ed = Educator.

The experimenter started to present the first family, taking one big bear and saying: “Let’s play, I introduce you to bear-mother Lisa (the experimenter takes one big bear and puts it down in front of her), and to her 2 cubs: Carlo (the experimenter takes two small bears from the bag, and shows one of the two cubs and puts it in front of the bear-mother on her right) and Marco (the experimenter showed the other cub and puts it in front of the bear-mother on her left)”. Behind the back of each bear-mother, two biscuits were hidden in a pocket. The experimenter took the two

biscuits and showed one by one to the bear-mother Lisa, she mimicked an equal distribution of the biscuits saying: “Bear-mother Lisa gives one cookie to Carlo and another to Marco”. Then the experimenter took the second big bear form the bag and, acting a similar presentation of the first family, she said: “There is also another bear family: Bear-mother Maria with her cubs, Antonio and Alessio”. The experimenter took the two biscuits from the back of Maria and mimicked an unequal distribution of the biscuits saying: “Bear-mother Maria gives two biscuits to Antonio and nothing to Alessio”. Finally, the experimenter, taking the two bear-mothers and putting them in front of the baby (at 50-60 cm), asked the baby “Now, let’s play together! Pick the good bear-mother”. Once the baby took one bear-mother or pointed one, the experimenter thanked him/her and let the child play a bit with the bears. The educators were instructed before the study not to talk to the infants or point to the bears, if infants were reluctant to choose, a second experimenter behind the educator prompted the educator with a slight touch of the shoulder to help the infant get up to go towards the bears.

The following were counterbalanced across infants: order and side of distribution (equal vs. unequal), blue or green bowtie for the bear families. The entire session lasted approximately 5 minutes.

5.2.1.3 Infants’ coding responses

After the testing phase, the experimenter wrote on a sheet of paper infants’ responses and later she saw the recordings for any doubt. Furthermore, the experimenter coded infants’ response time, i.e. the time it took for the infants to reach or to point to the bear from the experimenter’s request to take the good bear. An independent coder recoded all infants’ responses and agreed with the original experimenter on 100% of trials.

5.2.2 Results and Discussion

Infants' responses to the request of pick up "the good bear-mother" are represented in Figure 2 (a). Seventeen infants (out of 23) selected preferentially the unfair mother (p = .03, two-choice binomial test, two-tailed). The response time to choose a bear, either by pointing or grasping, was 47.50 sec (SD = 49.62) for infants who chose the fair bear-mother, and 24.94 sec (SD = 18.46) for infants who chose the unfair bear-mother. No significant difference emerged between the two response times (z = -.84, p = .40).

Infants' moral competence in the domain of fairness seems not to be mapped at 20 months onto an appropriate lexical item. When infants were explicitly asked to pick up the good bear-mother, they were oriented towards the unfair one. The result of the Experiment 1 is contrary of our initial hypotheses and it seems to highlight an interaction problem between the sense of fairness and the lexical knowledge of the word 'good'.

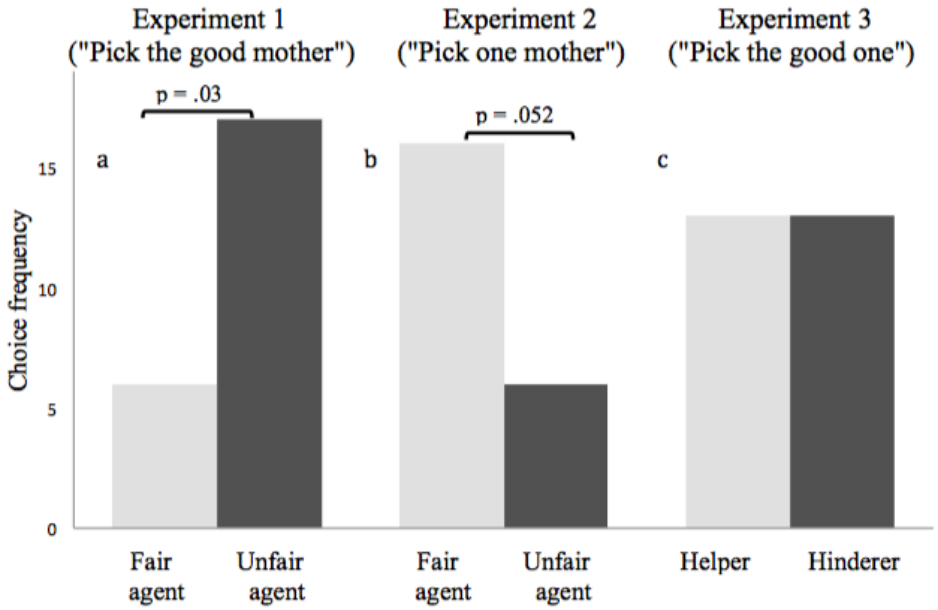

Figure 2. For the domain of fairness: (a) twenty-month-old infants' responses after the Experimenter asked them to pick the good bear-mother between a fair and an unfair distributors (Experiment 1); (b) responses of another group of infants after the Experimenter asked them to pick one of the bear-mothers (Experiment 2). For the domain of harm: (c) infants' responses after the Experimenter asked them to pick the good one between a helping and a hindering distributor (Experiment 3).

5.3 Experiment 2

To exclude possible problems in the procedure of the Experiment 1, we run Experiment 2, as a control study, where the task was to pick one of the distributors not specifying the characteristic concerning the goodness of the agent. In this second Experiment, the hypothesis is that infants are selectively oriented towards the fair distributor, as was previously found (e.g., Geraci & Surian, 2011; Meristo & Surian, 2013; Schmidt & Sommerville, 2011; Sloane et al., 2012; Sommerville, et al., 2013).

5.3.1 Method

5.3.1.1 Participants

A group of 23 healthy full-term infants of 20 months of age (12 females, M_{age} = 20 months, 14 days, age range: 18 months, 2 days to 25 months, 0 days) were recruited at local public and private nurseries of Trento, Italy. Fifteen additional infants were excluded from the study due to their refusal to participate (n = 8), interference of the educator (n = 4), procedural error (n = 3). The recruitment method was the same of the Experiment 1.

5.3.1.2 Stimuli and procedure

The stimuli and the procedure were similar to those followed in Experiment 1. The main difference concerned the final task requested to the infants. In this case, at the end of the presentation of the bear families, the experimenter asked the infants: “Pick one bear-mother”.

5.3.1.3 Infants’ coding responses

The coding was the same followed in Experiment 1. The independent coder agreed with the original experimenter on 100% of trials.

5.3.2 Results and Discussion

Infants' responses to the request of pick up "one of the bear-mothers" are represented in Figure 2(b). Sixteen infants (out of 22) preferred the fair mother who equally divided resources between her cubs (p = .052, two-choice binomial test, two-tailed).

The response time to choose a bear, either by pointing or grasping, was 24.76 sec (SD = 27.41) for infants who chose the fair bear-mother, and 31.67 sec (SD = 26.42) for infants who chose the unfair bear-mother. No significant difference emerged between the both response time (z = -.60, p = .55).

The results of this experiment, on infants' preference for the fair agent, confirmed the presence of an emerging sense of fairness at 20 months of age. This reassures that the unexpected result of the Experiment 1 is really linked to the introduction of the word 'good' and not to procedural problem.

5.4 Experiment 3

Here, we tested whether infants correctly map the word 'good' in the domain of harm. Previous research showed that already in the first year of life infants prefer agents that help rather than hinder others (e.g., Dunfield & Kuhlmieier, 2010; Hamlin, et al., 2007; Hamlin, et al., 2011; Kuhlmeier, et al., 2003).

If infants' moral competence on this domain is mapped at this age onto an appropriate lexical item, we hypothesize that infants are selectively oriented towards the helper agent rather than the hinderer agent. In this case, we did not run a control study because already Hamlin et al. (2007) showed a robust preference in 10- month-old infants to choose the helper using a similar procedure of the present study. Therefore, we directly run Experiment 3 with the task of picking up the good

characters in a sample of infants with a similar age of Experiments 1 and 2.

5.4.1 Method

5.4.1.1 Participants

A group of 26 healthy full-term 20-month-olds (14 females, M_{age} = 20 months, 81 days, age range: 17 months, 6 days to 25 months, 10 days) were recruited at local public and private nurseries of Trento, Italy. Twelve additional infants were excluded from the study due to their refusal to participate (n = 8), interference of the educator (n = 3), procedural error (n = 1). The recruitment method was the same of Experiment 1.

5.4.1.2 Stimuli and procedure

Infants were presented with four familiarization events, followed by a test trial as the study of Hamlin et al. (2007). In the familiarization events, two helping and two hindering events were shown. The familiarization events started by showing a climber (a red ball) that jiggled up and down at the bottom of a hill and then it attempted twice to climb a hill, and each time it fell back to the bottom. On the third attempt, in the helping events, the climber was pushed up the hill by the helper, whereas in the hindering events, the climber was pushed down the hill by the hinderer. The helper entered the scene always from the lower right, and the hinderer from the upper left. The helper and the hinderer could be a blue square or a yellow triangle. Total event duration was 160 sec (40 sec for each video). The order presentation of the helping and hindering events and the colored shapes (blue square vs. yellow triangle) were counterbalanced.

At the end of the four familiarization events, in the test trial infants were presented with a white board where there were the helper shape and the hinderer shape (25 cm apart). The experimenter said to infants: “Pick up or touch the good one!” The side of presentation of the two

shapes was counterbalanced.

5.4.1.3 Infants' coding responses

The coding was the same followed in Experiment 1. In this case, for the infants' response time the experimenter coded the time it took for the infants to reach with the hand the choose a character from the experimenter's request to pick up the good character. The independent coder agreed with the original experimenter on 100% of trials.

5.4.2 Results and Discussion

Infants' responses to the request of pick up "the good one" are represented in Figure 2(c). Infants' responses were equally distributed in the sample: 13 infants picked up the helper, and 13 the hinderer. The response time to choose a character was 9.38 sec (*SD* = 21.54) for infants who chose the helper, and 13.85 sec (*SD* = 18.88) for infants who chose the hinderer. No significant difference emerged between the two response times (z = -1.28, p = .20).

Infants' moral competence in the domain of harm seems not to be mapped at 20 months onto an appropriate lexical item when explicitly asked to pick up the good one; they were not selectively oriented to any of them. An interaction problem between the sense of harm and the lexical knowledge of the word "good" emerged also in this domain.

5.5 Experiment 4

In Experiment 4, infants were tested for their knowledge of the word 'good' in the domain of food. We hypothesize that 20-month-old infants are able to associate the label 'good' to a food that they really like, considering that on one hand at this age infants usually have tried different kinds of food and they are able to express (verbally or behaviorally) their preferences, and on the other hand the caregivers and, adults in general, say often to them in eating contexts: "Is it good? Do you like

it?”. Therefore, it is plausible that at 20 months of age, infants correctly map the word 'good' in the domain of food.

5.5.1 Method

5.5.1.1 Participants

A group of 23 healthy full-term 20-month-olds (13 females, M_{age} = 20 months, 28 days, age range: 17 months, 5 days to 25 months, 10 days) were recruited at local public and private nurseries of Trento, Italy. Nine additional infants were excluded from the study due to their refusal to participate. The recruitment method was the same of Experiment 1.

5.5.1.2 Stimuli and procedure

Infants were presented with a choice test with five pairs of food cards. In the first pair, there was a biscuit in one card and broccoli in the other; in the second pair; an ice cream and a fennel, in the third; candies and cabbage, in the fourth; biscuits and vegetables, and in the last; pizza and vegetables (see Figure 3). The cards were colored and represented real images of food. Their dimensions were 15 cm width X 21 cm high. The side of presentation of the two cards was counterbalanced. The experimenter asked to infants to pick up or touch “the good one”.

Figure 3. The five pairs of food cards.

5.5.1.3 Infants' coding responses

The coding was the same followed in Experiment 1. The independent coder agreed with the original experimenter on 100% of trials.

5.5.2 Results and Discussion

For the first two pairs of cards and for the last pair, infants preferred: biscuit, ice cream and pizza rather than broccoli, fennel and vegetables (for all pairs $p < .01$, two-choice binomial test, two-tailed). Also regarding the pair of cards with biscuits and vegetables, infants' preference approached significance for biscuits ($p = .052$, two-choice binomial test, two-tailed). Instead, for the

pair of cards with cabbage and candies, infants did not show any preference. A possible explanation (suggested by educators) is that usually at this age candies are forbidden, parents say to children that candies are bad, so very few infants could think that candies are a good food.

The mean frequencies of infants' responses for the food typically liked and the food typically disliked are represented in Figure 4. Most infants selected the items that are typically liked by young children rather than the food typically disliked, $t(8) = 4.87$, $p = .001$. All together, these results suggest that at 20 months of age, the term 'good' is correctly mapped for qualities in the domain of food.

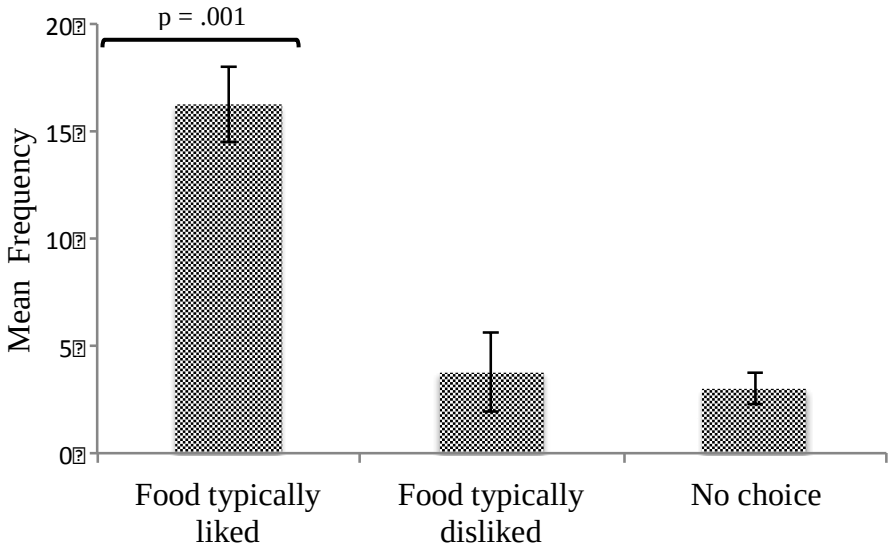

Figure 4. The mean frequency of infants who selected the items typically liked by young children (biscuit, ice cream, candies, biscuits, pizza) and of infants who selected the items typically disliked by young children (broccoli, fennel, cabbage). No choice indicates the mean frequency of infants who did not select any item.

5.6 Experiment 5

Considering that the results of the first four Experiments lead to think that at 20 months of age, the term 'good' is correctly mapped for qualities in the domain of food, but not yet in the core moral domains of fairness and harm, another experiment was run with older infants (30 months of age). In Experiment 5, the word 'good' was tested in the domain of fairness in infants of two years

and a half, in a similar way as in Experiment 1 with fair and unfair distributors. The hypothesis is that infants are not selectively oriented to neither of the two agents if their moral competence is not yet mapped onto an appropriate lexical item, or that they are selectively oriented towards the fair distributor if their moral competence is mapped onto an appropriate lexical item at this age.

5.6.1 Method

5.6.1.1 Participants

A group of 42 healthy full-term infants of two years and half (24 females, M_{age} = 30 months, 24 days, age range: 26 months, 25 days to 34 months, 3 days) were recruited at local public and private nurseries of Trento, Italy. Ten additional infants were excluded from the study due to their refusal to participate (n = 8), interference of the educator (n = 2). The recruitment method was the same of Experiment 1.

5.6.1.2 Stimuli and procedure

The stimuli and the procedure were similar to those followed in Experiment 1.

5.6.1.3 Infants' coding responses

The coding was the same followed in Experiment 1. The independent coder agreed with the original experimenter on 100% of trials.

5.6.2 Results and Discussion

Infants' responses to the request of pick up "the good bear-mother" are represented in Figure 5(a). Eighteen infants (out of 42) selected preferentially the unfair mother (p = .441, two-choice binomial test, two-tailed). The response time to choose a bear, either by pointing or grasping, was 25.56 sec (SD = 16.51) for infants who chose the fair bear-mother, and 34.87 sec (SD = 43.33) for infants who chose the unfair bear-mother. No significant difference emerged between the two response times (z = -.70, p = .484).

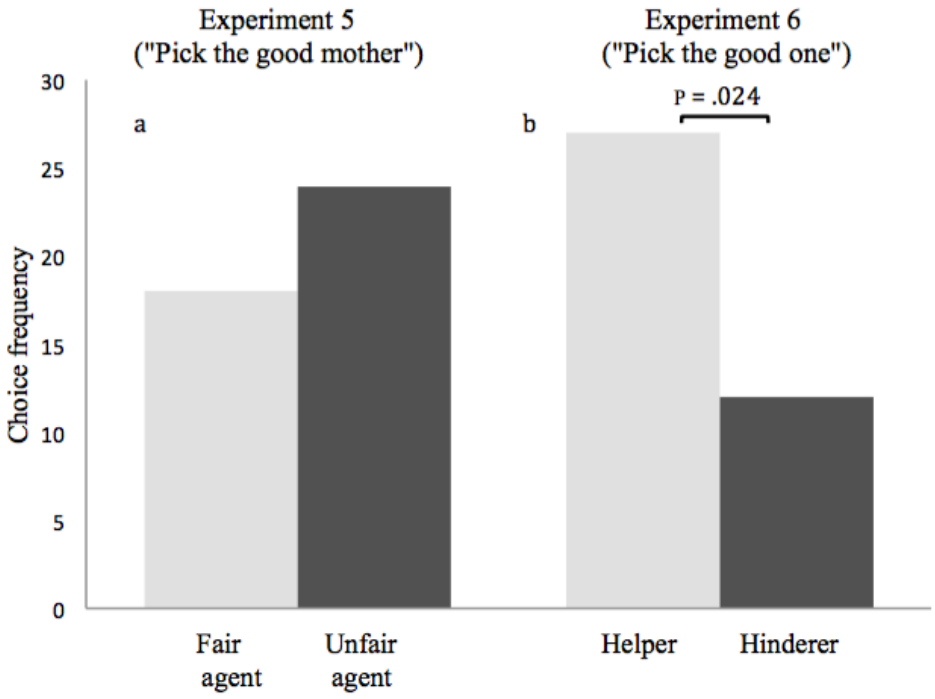

Figure 5. For the domain of fairness: (a) thirty-month-old infants' responses after the Experimenter asked them to pick the good bear-mother between a fair and an unfair distributor (Experiment 5). For the domain of harm: (b) infants' responses after the Experimenter asked them to pick the good one between a helping and a hindering distributor (Experiment 6).

Infants' moral competence in the domain of fairness seems not to be mapped at 30 months onto an appropriate lexical item. When infants were explicitly asked to pick up the good bear-mother, they were not selectively oriented towards the fair or unfair agents.

5.7 Experiment 6

In this Experiment, the word 'good' was tested in the domain of harm in infants of two years and a half, in a similar way as in Experiment 3 with helping and hindering agents. The hypothesis is that infants are not selectively oriented to neither of the two agents if their moral competence is not yet mapped onto an appropriate lexical item, or that they are selectively oriented towards the helper if their moral competence is mapped onto an appropriate lexical item at this age.

5.7.1 Method

5.7.1.1 Participants

A group of 39 healthy full-term infants of two years and a half (23 females, M_{age} = 31 months, 1 day, age range: 26 months, 25 days to 33 months, 25 days) were recruited at local public and private nurseries of Trento, Italy. Eight additional infants were excluded from the study due to their refusal to participate (n = 4), interference of the educator (n = 2), procedural error (n = 2). The recruitment method was the same of Experiment 1.

5.7.1.2 Stimuli and procedure

The stimuli and the procedure were similar to those followed in Experiment 3.

5.7.1.3 Infants' coding responses

The coding was the same followed in Experiment 3. The independent coder agreed with the original experimenter on 100% of trials.

5.7.2 Results and Discussion

Infants' responses to the request of pick up "the good character" are represented in Figure 5(b). Twenty-seven infants (out of 39) picked up the helper rather than the hinderer and the

difference in this choice test was significant (p = .024, two-choice binomial test, two-tailed). The response time to choose a character was 6.37 sec (SD = 6.66) for infants who chose the helper, and 6.33 sec (SD = 6.01) for infants who chose the hinderer. No significant difference emerged between the two response times (z = -.05, p = .964).

Infants' moral competence in the domain of harm seems to be mapped at 30 months onto an appropriate lexical item. When infants were explicitly asked to pick up the good one, they were selectively oriented towards the helping agent.

5.8 General Discussion

Overall, the results of the present study suggest that at 20 months of age, the term 'good' is correctly mapped for qualities in the domain of food, but not yet in the core moral domains of fairness and harm. Instead, at 30 months of age, the term 'good' is correctly mapped for qualities in the domain of harm, but not yet in the core domain of fairness.

Regarding the fairness domain, in the Experiment 1, infants were explicitly asked to pick up the good bear-mother and they were oriented towards the unfair one rather than the fair. On the other hand, when infants were asked to pick up one of the bear-mothers (Experiment 2), they were oriented towards the fair one. This last result is in line with the findings of Geraci and Surian (2011) who showed with a manual choice test, a significant tendency at 16 months to pick up a fair puppet distributor rather than an unfair distributor. The curious thing in our findings is that when we added the term 'good' in the requests to pick up a bear, the results of the 20-month-olds are completely inverted.

A first consideration we could advance is that at 20 months, the term 'good' seems not to be associated with fairness qualities in the distributive behavior of the puppets. When we considered an older group of infants (Experiment 5), we found that at two years and a half infants were no

more oriented towards the unfair bear as at 20 months, they simply were not selectively oriented to any of them.

The second consideration is that probably, the term 'good', in particular at 20 months of age, is associated with something else that we have to deepen in future studies. For example, we could hypothesize that the word 'good' could activate in infants the link with food, and this activation could focalize their attention on the little bear who received two biscuits and, consequently, they oriented preferentially towards the unfair mother independently of the distributors' fairness. Increasing with age, more infants start to lose this strong and univocal link between 'good' and food, and they start to link 'good' also to other contexts (i.e., fairness). In sum, these first results demonstrated that there is an emerging sense of fairness at 20 months, at this age infants' moral competence in the domain of fairness does not seem to be mapped onto an appropriate lexical item yet, though it starts to be mapped at 30 months in some infants, but not in the majority.

In the other hand, the harm domain, in Experiment 3, infants at 20 months of age were explicitly asked to pick up the good one between a helper and a hinderer, and they were not selectively oriented to any of them. Instead, at 30 months of age (Experiment 6), infants were selectively oriented to the helper. Previous literature showed a robust preference in 10-month-old infants to choose the helper using a similar procedure but asking to infants only to pick up one (Hamlin et al., 2007).

In our case, it is extremely interesting that there are no significant results at 20 months, because contrarily to Experiment 1, here there is no food in the presented scenarios. The term 'good' seems to be associated with nothing, because children pick up by chance.

We might also assume that in the domain of harm, 20-month-old infants' moral competence does not seem to be mapped onto an appropriate lexical item, until they reach about 30 months of age when infants are able to link the word 'good' also to the harm contexts, as we found in

Experiment 6.

Finally, in Experiment 4, we tested the word 'good' in the domain of food. As predicted, we found that the term 'good' is correctly mapped for qualities in the domain of food in 20-month-old infants.

Considering that preverbal infants, even younger of our participants, have shown to possess the ability to assign positive values to fair and helping actions (e.g. Hamlin, et al., 2011; Meristo & Surian, 2013), it seems that the ability to map the underlying representations to the word 'good' may be a relatively a late achievement. Certainly, the word 'good' is correctly associated at 20 months only with the domain of food. Not only correctly, but also strongly associated so much that we could hypothesize that it interferes with the other domains in the presence of food, as revealed in Experiment 1. At 30 months, this word is correctly associated with the domain of harm, and it starts in some infants to be associated also with the domain of fairness.

In conclusion, that the meaning of 'good' at 20 months operates only in the food domain, as an adjective, and at 30 months operates also in the domain of harm. Therefore, with the present research we highlighted an asynchrony across moral development, in particular for the domains that involve the sense of fairness and harm, and the linguistic domain. There is an emerging sense of fairness and harm in 20-month-olds, but these concepts are not yet correctly mapped at a linguistic level, until 30 months for the harm domain and later for the fairness domain.

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Chapter 6

PRELIMINARY REPORT

Do children consider merit? A cross-cultural study based on Colombian and Italian distributive actions

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6.1 Introduction

Justice amounts to distributing resources fairly in a variety of situations. Implementing justice to the world usually includes taking into account many different parameters, for this reason, justice is based on principles such as equity, equality and need (Sigelman & Waitzman, 1991). The equity-based justice requires that resources are allocated according to the quantity or quality of goods and services produced by an individual's: productivity, commitment and competence. The need-based justice requires that resources are allocated according to the needs of people eg. poverty and disadvantage. And, the equality-based justice (fairness) implies that everyone should receive a resource evenly. According to Damon (1977, as described in Kanngiesser & Warneken, 2012), children are assumed to go through three developmental stages: infants tend to be selfish (distribute awards according to their own interest), preschoolers tend to be egalitarian (equal distributions, regardless of an individual's contributions) and older children start to consider an individual's contribution (merit or equity). Moreover, related literature explains how merit-based behaviors emerges later in development (Almas, Cappelen, Sørensen, Tungodden, 2010; Enright & Sutterfield, 1980; Piaget, 1932; Leventhal, Popp, Sawyer, 1973; Sigelman & Waitzman, 1991), using however methods that might be very challenging for young children, potentially hiding their early competence.

In the last decade, developmental studies asking children to distribute resources to third parties have consistently demonstrated that the concern for fairness and merit emerges early in development. Infants expect resources to be distributed equally (Schmidt & Sommerville, 2011; Sloane, Baillargeon, Premack & 2012; Sommerville, Schmidt, Yun & Burns, 2013), and when having to choose between a puppet who performed an equal distribution and another puppet who did not, they demonstrate a clear preference for the egalitarian puppet (Geraci & Surian, 2011). 3-year-olds when presented with a simple story (set of vignettes), reasoned that a character that

finished a task was most likely to receive more cookies than a character that became bored and stopped early, although this ability may be hidden by a preference of equality (Baumard et al., 2012). In a cross-cultural study based on the same procedure using 5-year-old Turcana children, Liénard, Chevallier, Mascaro, Kiura, Baumard (2013) revealed that these children present the same understanding of merit as the western children.

Similarly, other studies with 3-year-olds reveal that infants share mostly equally after they take into account merit when distributing resources towards an individual that had contributed more to a task but had received less compensation (Hamann, Bender & Tomasello, 2014), and when sharing or giving more resources to a partner that had contributed more to a task (Kanngiesser & Warneken, 2012). Also, in situations when they choose not to be fair, infants seem to understand that they should have been fair (Smith, Blake & Harris, 2013). Finally, Rochat, Dias, Liping, Broesch, Passos-Ferreira, Winning and Berg (2009) suggest that the sense of fairness, deferred gratification and reciprocity principles are all important at the core of the human enculturation process, and that these form the roots of the human sense of equity. For this reason, it would be important to see how this sense develops in children growing up in very different sociological, economical and cultural environments.

Along these lines of previous studies, it thus remains an open question whether children of different social-economic status/levels (SES) and cultural environments (mainly all research is based on western populations) will act in accordance with this proficiency when distributing resources in third-person situations.

Research on a Colombian population carried out by Posada and Wainryb (2008) of children exposed to violence in a "displaced environment", showed that these 'displaced children' (6-9-year-olds and 13-16 year olds) are well aware of the moral principles on stealing, and hurting others, and

how these behaviors are morally wrong. Although, when asking older participants (adolescents) if by taking revenge on a person who 'had hurt his family and they saw this person in the street, if it was ok to hurt them?', generally, participants replied that it was not morally wrong to hurt a person in these circumstances, but rather because those people would come back and punish whoever engaged on such actions. These children have been uprooted as a consequence of armed conflict and human rights violations, seeking safety abroad or within their own borders. To evaluate the role of socioeconomic status and exposure to violence on concepts of harm, Ardila-Rey, Killen, and Brenick (2009) carried out a study of both displaced (displaced by war and living in shantytowns) and middle-income (living in a relatively peaceful town) children in Colombia. They found significant differences in 6- to 12-year-olds' moral judgments based on levels of exposure to violence and living conditions. All children viewed acts of harm (hitting) and unfair distribution of toys (not sharing) as wrong using moral reasons. However, the displaced children judged it more legitimate to hit in reaction to provocation or retaliation than nondisplaced children who had experienced minimal exposure to violence. All children viewed post-conflict reconciliation between the transgressor and recipient as feasible and worthwhile.

Half of the world's displaced people are children. Currently, it is estimated that there are 10 million children refugees worldwide; an additional 13 million children are internally displaced within their own countries. In Colombia alone, the number of displaced Colombian children surged to 17, 573 in 2012, children that have been forcibly displaced from their homes and towns during the past 15 years (Stringer, 2013). These numbers also carry the disturbing implication that more and more of the world's children are being sucked into a bleak moral vacuum or a psychological space devoid of basic human rights and values. How might children's moral development be altered by the violence, lawlessness, and deprivation to which they are exposed? Or, is it simply a universal phenomenon that is independent from social situations.

In the present study, we examined if children of two very different cultural environments are able to take merit into account, studying 3, 4 and 5-6 year old children. We have taken into account ideas extracted from Baumard et al. (2012), but unlike them, we showed children a scenario instead of telling a story to make it more dynamic or active when we interpreted the scenes, this makes it also more entertaining for children at this age. Children were presented with two characters, a hardworking bear and lazy working bear that were asked by an experimenter to play a game of building up a house. One starts working and eventually after declaring that it is hard work finishes the game; afterwards the other bear starts working and stops do to exhaustion without finishing the game. Lastly, children were asked to distribute three biscuits.

We evaluated children's biscuit distributions. The task involved two distribution phases, an initial and final phase. The initial phase allowed children to distribute any amount of biscuits to their liking and the final phase, however, children are asked to distribute any remaining biscuit. Taking into account previous studies described above, children sometimes favor equality when given the chance, and that they have an underlying ability to understand that a greater contributor has the right to more than a lesser contributor. We included 3, 4 and 5-6 year old children to our study and hypothesized that by 5-6-year-olds would have less problem reasoning to which character the final biscuit is distributed as opposed to the younger groups, and we assumed that they would choose the hardworking bear. Moreover, we wanted to observe if there is a difference in a determined context, thus we observed Italian and Colombian children. The Colombian children, from a 'displaced population'. Children that have dealt with poverty and trauma from the displacement experience, single parents, lack of employment, poor hygiene and physical abuse. And, the Italian children from Trento, which are exposed to a completely different western environment.

6.2 Experiment 1

Preschoolers are presented with a typical situation of distributive justice involving varying levels of contribution. With a similar procedure as Baumard, Mascaro and Chevallier (2012) Children are asked to distribute 3 biscuits at the end of the task. We predicted like Baumard et al. (2012) that some children would spontaneously favor equality but that beyond this egalitarian response children would still think that the bigger contributor has a right to slightly more than the lesser contributor.

6.2.1 Method

6.2.1.1 Participants

Ninety-eight Italian born preschoolers were recruited. Children were divided by three age groups: nineteen 3-year-olds (10 females; mean age = 43 months and 5 days; SD = 2.5; range = 39 - 47 months). 3 children were excluded for not responding to the task. twenty-six 4 year-olds (12 females; mean age = 53 months and 1 day; SD =8.8; range = 48 – 59 months). 1 child was excluded for not responding to the task. Fifty-three 5-6-year-olds (22 females; mean age = 66 months and 2 days; SD = 5.1; range = 60 - 76 months). Recruitment took place in two preschools in Trento (Northern Italy), serving middle class communities. The local coordinator of preschools contacted the schools and sent them the consent forms and the information regarding the study to give out to all parents.

6.2.1.2 Materials and Procedure

The University of Trento ethics committee approved the method. Participants were tested individually in a quiet room, close to their classrooms. The experimenters first familiarized the child with two identical large stuffed bears (characters or agents), saying “see, this is Antonio, and this is

Roberto. They play together. Can you show me which is Antonio and which is Roberto? Good! Bravo!" Bear names matched the gender of the child, they differed by having different colored bowties (green and blue; counterbalanced between subjects). The experimenter then assured the child remembered the names of each bear. After this important step the 'building game' is introduced. While sitting on the floor with the child, the experimenter says: "let's all play a game, but let's start with you Antonio (grabbing one of the bears), I would like to see a house", while sitting about 30 cm away from the box, one of the bears has to reach out and grab the basket where the blocks are and starts building a house, the bear showing signs of difficulty building it says "this is hard work", but continues going and after a while builds up an identifiable house, finally saying with satisfaction: "oh how nice, I finished". The experimenter then says: "ok, what about you Roberto?" and picks up the other bear which instantly grabs his blocks from the basket and starts building a house as well, next to the other bear. After a while (about 1 minute), he starts to show signs of boredom by sighing and finally utters: "I don't want to play anymore, I'm tired" and does not finish the game. Thus, there was a 'hard-working bear' (the character that completed the task) and a 'lazy-working bear' (the character that gave up). The child sat on the floor in front both bears and two trays containing identical sets of Duplo LEGO blocks.

After this final action, on the initial distribution phase the experimenter says, "ok then, now I have three biscuits" and passes them to the child, all in a horizontal way on a plate (Fig. 1), and tells him to: "who would you give a biscuit to? Antonio or Roberto?" (names are counterbalanced between subjects) after 15 seconds the child has to have completed this task, if not the experimenter encourages him to do it again. On the final distribution phase, after the child has done their first distribution and there are still some biscuits left, the experimenter asks him: "Oh look! There are still some left, who would you give it to? Antonio or Roberto?" After the child distributes the final biscuits, the experimenter asked "Why did you give it to …?" Justifications mentioning the

characters' respective levels of contribution were considered correct (e.g., "because Antonio finished the house" or similar positive responses) other justifications (e.g., "because he looked nicer") or absence of justification (e.g., "I don't know", "because yes" or silence) were coded as incorrect (bears, names of bears, position of the bears and sides of the hard-working and lazy-working bears will all be counterbalanced). A second coder classified all justifications and there was an agreement of 100% between both coders in experiment 1 and 2.

Figure 1. Image of the initial distribution phase, showing both the hard-working bear with his completed house and the lazy working bear with his uncompleted house. The experimenter is displaying the act of handing the plate with biscuits to the child.

6.2.2 Results

We took three variables into account: (a) who was given a biscuit first, if the hard worker or the lazy worker (b) children's initial distribution phase, i.e. if given an equal distribution, and(c) children's final distribution phase, i.e. which is given the final biscuit.

53 out of 98 children gave the first cookie to the hardworking bear, which reveals no significant difference, $p = .48$, two-choice binomial, $OR = 1.18$ (8 out of 19 3-year-olds, $p = .65$,

two choice binomial, *OR* = .73. 14 out of 26 4-year-olds, *p* = .85, two-choice binomial, *OR* = 1.15. 30 out of 51 5-6-year-olds, *p* = .26, two-choice binomial, *OR* = 1.43).

In children‘s initial distribution, 11 out of 98 children gave one biscuit to each bear, *p* < .001, nine-choice binomial, *OR* = .13 (3 out of 19 3-year-olds, *p* <.01, nine choice binomial, *OR* = .19. 2 out of 28 4-year-olds, *p* < .001, nine choice binomial, *OR* = .08. 6 out of 51 5-6-year-olds, *p* < .001, nine-choice binomial, *OR* = .13). These results show that children showed no significant preference towards an egalitarian distribution in the initial distribution phase (see Fig. 2). Considering the other 87 children who did not chose an egalitarian distribution, 49 gave one biscuit to the hardworking bear, *p* = .28, two choice binomial, *OR* = 1.29 (7 out of 16 3-year-olds, *p* = .8, two choice binomial, *OR* = .78. 14 out of 26 4-year-olds, *p* = .85, two choice binomial, *OR* = 1.17. 28 out of 45 5-6-year-olds, *p* = .14, two-choice binomial, *OR* = 1.75). Moreover, of these 87 children 12 children gave all biscuits to one of the bears in the initial distribution phase. 9 out of 12 gave all the biscuits to the hardworking bear, *p* = .15, two choice binomial, *OR* = 3. With no difference between age groups, $\chi^2(4) = 2.56$, *p* = .64. There was no difference between the mean age of the 11 egalitarian children (M = 58.15, SD = 10.17) and the mean age of the 49 children (M = 60.25, SD = 10.53) favoring the hardworking bear, *t*(89) = .4, *p* = .69.

Children's initial distribution:

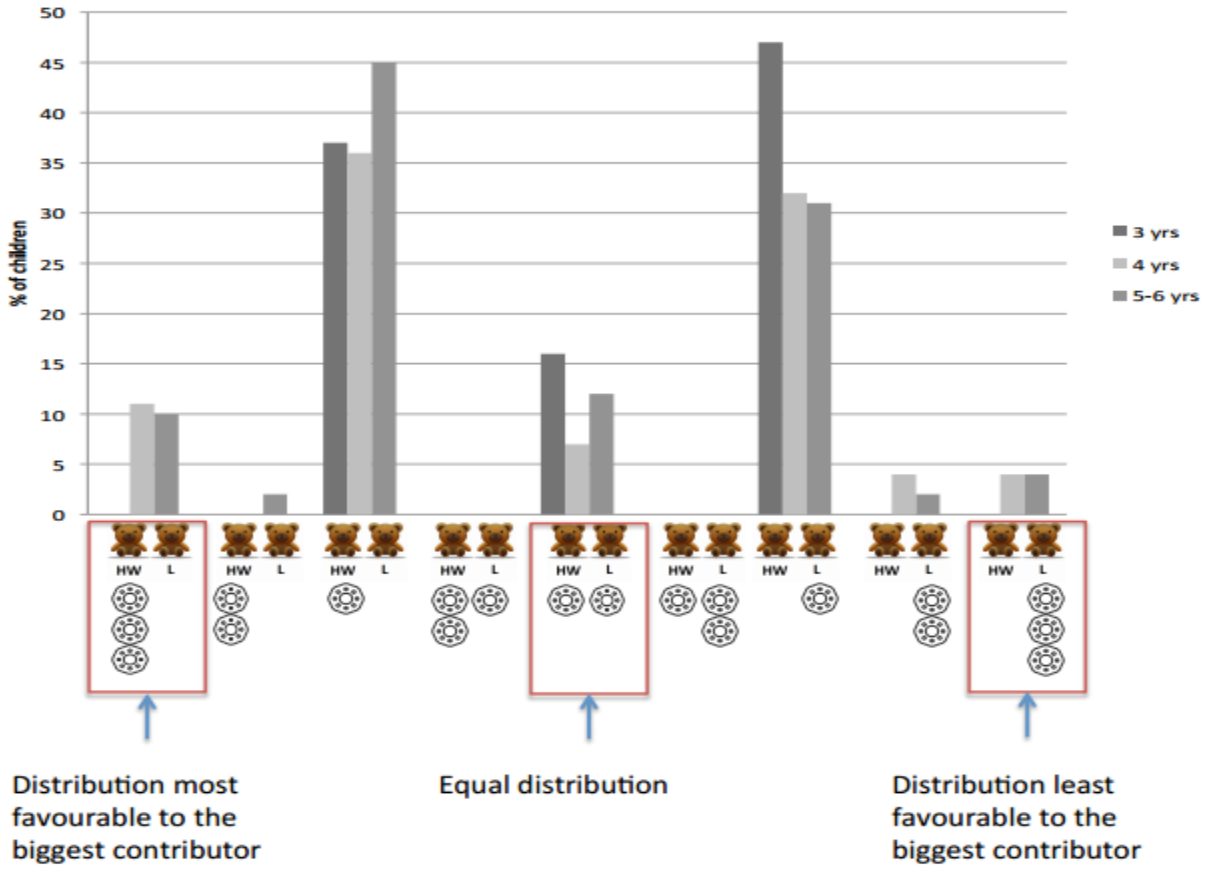

Figure 2. Pattern of the initial distribution in 3, 4- and 5-6-year-olds. *Note:* HW = hardworking bear, L = lazy working bear.

In the final distribution, the hardworking bear was favored by 33 children out of 63 $p = .9$, two-choice binomial, $OR = 1.06$, showing no significant difference, even when considering all age groups separately (7 out of 14 3-year-olds, $p = 1.0$, two-choice binomial, $OR = 1$. 8 out of 18 4-year-olds, $p = .81$, two-choice binomial, $OR = 8.27$. 18 out of 32 5-6-year-olds, $p = .6$, two-choice binomial, $OR = 1.27$). Finally, when considering both the initial distribution when given only one biscuit to a bear and the first response in the final distribution phase, children's response was mainly egalitarian in all age groups: 61 out of 72 children, $p < .001$, two choice binomial, $OR = 5.55$.

We also analyzed children‘s justifications and found that a minority of children provided correct justifications (22 children out of 98, 1 out of 19 among 3-year olds, 3 out of 26 among 4-year olds and 18 out of 53 among 5-6-year olds). There was a significant increase in children‘s capacity to justify their judgments ($p = .01$, Fisher‘s test). Note that older children have also the capacity of giving more elaborate and creative justifications like: “because this house was much bigger”, “because I gave one to Antonio and I had other two biscuits to give out” and “because he finished the house without stopping”.

6.3 Experiment 2

This experiment took place in Cali, Colombia. We used the same structure as in experiment 1, but this time we recruited children from a completely different SES background and culture. We predicted that children from a developing country would perform in a similar way than the western European children showing that children’s social development is a universal rule, and proving once more that, despite their contextual differences, children have an egalitarian tendency with a slight preference towards the greater contributor.

6.3.1 Method

6.3.1.1 Participants

One-hundred and seven Colombian born children were tested. Twenty-eight 3-year-olds (14 females; mean age = 44 months and 3 days; SD = 2.0; range = 38 - 47 months). 4 children were excluded for not responding to the task. Forty-one 4-year-olds (22 females; mean age = 52 months 7 days; SD = 7.2; range = 48 – 58 months) and thirty-eight 5-6 year olds (21 females; mean age = 5 years 68 months 1 day; SD = 12.1; range = 61 - 73 months) all from the same SES background have been studied. We excluded children that have been diagnosed with cognitive disorders that could in

any way interfere with the outcome of this study. Informed consents, in written form, were given out to parents of all children who participated in this study.

6.3.1.2 Materials and Procedure

The University of Valle Ethics Committee on the Use of Human Subjects in Research have approved the ethics of this study. Participants were tested individually in a quiet room, close to their classrooms. The materials and procedure were identical to those used in Experiment 1.

6.3.2 Results

We used the same three variables used previously: (a) who was given a biscuit first, if the hard worker or the lazy worker (b) children's initial distribution phase, i.e. if given an equal distribution, and(c) children's final distribution phase, i.e. which is given the final biscuit.

60 out of 107 children gave the first biscuit to the hardworking bear, which reveals no significant difference, $p = .25$, two-choice binomial, $OR = 1.28$ (20 out of 28 3-year-olds, $p < .05$, two choice binomial, $OR = 2.5$. 21 out of 41 4-year-olds, $p = 1.0$, two-choice binomial, $OR = 1.05$, and 19 out of 38 5-6-year-olds, $p = 1.0$, two-choice binomial, $OR = 1$).

Taking into account children's initial distribution, 48 out of 107 children gave one biscuit to each bear, $p = .34$, nine-choice binomial, $OR = .81$ (13 out of 28 3-year-olds, $p = .85$, two choice binomial, $OR = .87$. 18 out of 41 4-year-olds, $p = .53$, two choice binomial, $OR = .78$. 17 out of 38 5-6-year-olds, $p = .63$, two-choice binomial, $OR = .82$), revealing no significant inclination towards an egalitarian distribution to this point (see Fig. 3). From the 59 remaining children that did not show an egalitarian distribution, 40 chose the hardworking bear, which differs from chance, $p < .01$, two-choice binomial, $OR = 2.11$ (13 out of 15 3-year-olds, $p < .01$, two choice binomial, $OR = 6.5$. 14 out of 23 4-year-olds, $p = .41$, two choice binomial, $OR = 1.6$. 13 out of 21 5-6-year-olds, p

= .38, two-choice binomial, *OR* = 1.63). With no difference between age groups, $\chi^2(4) = 3.27$, p = .51. There was no difference between the mean age of the 48 egalitarian children (M = 55.69, SD = 9.74) and the mean age of the 40 children (M = 54.2, SD = 10.82) favoring the hardworking bear, $t(77) = .58$, $p = .57$.

Children's initial distribution:

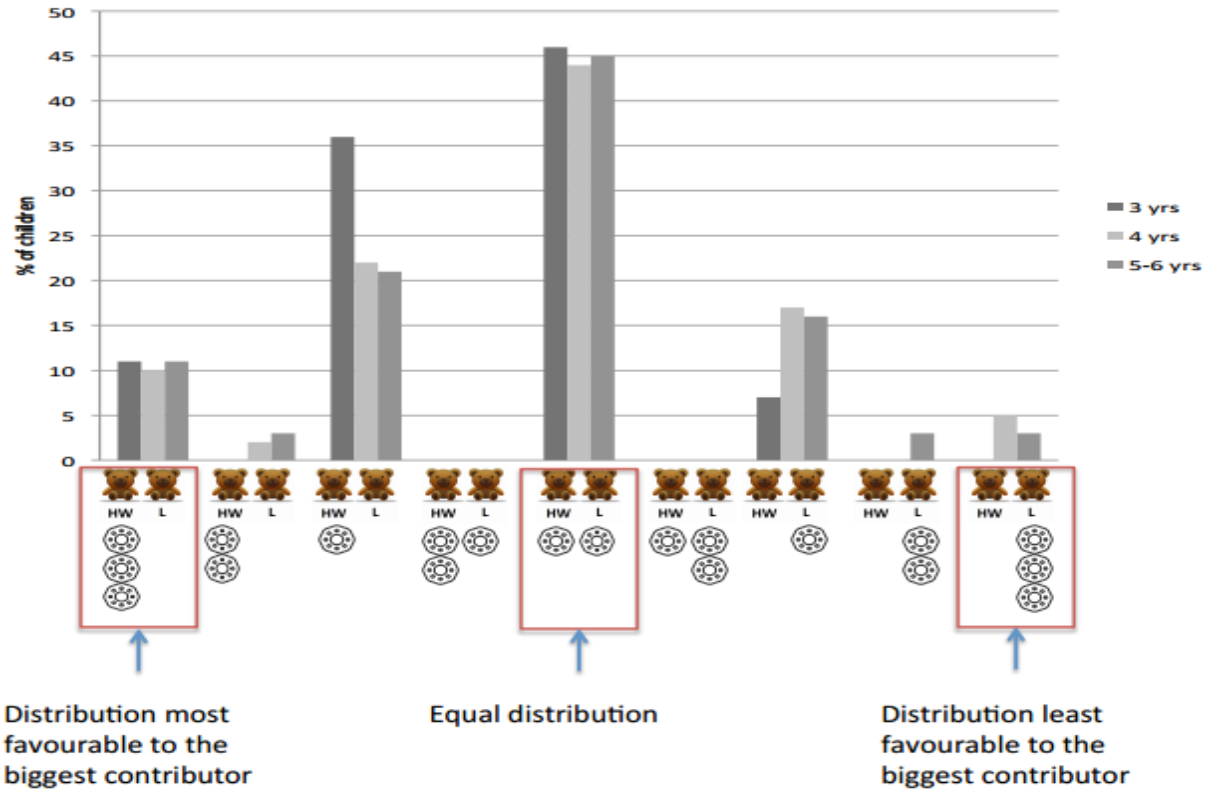

Figure 3. Pattern of the initial distribution in 3, 4- and 5-6-year-olds. *Note:* HW = hardworking bear, L = lazy working bear.

In the final distribution, the hardworking contributor was favored by 41 children out of 77 p = .65, two-choice binomial, *OR* = 1.14, showing no significant difference (9 out of 21 3-year-olds, p = .66, two-choice binomial, *OR* = .75. 17 out of 29 4-year-olds, p = .46, two-choice binomial, *OR* = 1.42. 15 out of 27 5-6-year-olds, p = .7, two-choice binomial, *OR* = 1.25).

Finally, when considering both the initial distribution when given only one biscuit to a bear and the first response in the final distribution phase, we found no significant difference in all age

groups for an egalitarian distribution: 40 out of 77 children, $p = .82$, two choice binomial, $OR = 1.08$.

Colombian children's justifications were also analyzed showing again a minority of children providing correct justifications (23 children out of 107, 1 out of 28 among 3-year olds, 5 out of 41 among 4-year olds and 17 out of 38 among 5-6-year olds). Again, there was a significant increase in children's capacity to justify their judgments with age ($p = .001$, Fisher's test). Note that children under four instead of not giving a justification, as many Italian children did, mainly responded "because yes".

We made a final analysis comparing both Italian and Colombian children, to see if age and country affected the percentage of children that selected an egalitarian distribution. We found that there was no significant difference in both samples, $\chi^2(2) = 3.70$, $p = .16$.

6.4 Discussion

We studied if children of two different cultural environments (Italian and Colombian) were able to consider merit when distributing goods to an individual that has contributed more to a task, and if, by having the opportunity to be egalitarian, they were able to share one biscuit with each recipient. Using a similar experimental procedure (ours with bears and acted out instead of vignettes) as Baumard, Mascaro, Chevallier (2012). These authors revealed that 3-year-olds are able to consider merit when prompted to do so, although, when given the opportunity to willingly distribute goods, they prefer to distribute in an equitable way. They provided evidence of an early development of equity and that young children understand that the greater contributor has more rights than the lesser contributor.

Did we prove that children as young as three of two very different societies are able to consider merit or also have an egalitarian choice when given the chance? We did not. Not only did we not find it in 3-year-olds, we also did not find it in the older children in both societies, Italy and Colombia. The initial distribution phase, however, revealed cross-cultural differences in children's spontaneous preferences: Colombian children had a stronger tendency (but not significant) to favor an egalitarian distribution but this initial egalitarian preference was less frequent among Italian children. This result is quite surprising since we expected that at least the Italian children (western children) should already engage in these behaviors (we will look into these issues later on). Furthermore, there was no consistent information for the final distribution phase in all age groups of both societies.

Having some inconsistencies with previous works, described above, there can be some ways to interpret these. Mainly we can hypothesize that it was a procedural problem, since our acted out scenario may be too verbal and more distracting to the younger children. However, if this is the case, why did we still not find an egalitarian tendency when given the chance after the initial phase or also a notorious favoritism towards the bigger contributor in the older children? Again, it could be a procedural issue, even if we used the same concepts as Baumard et al. (2012), we did a different experimental procedure (building a house instead of baking cookies), and a different environmental scenario (acting out the scene instead of showing a set of vignettes).

Other possibilities could be: that children did not confide with the experimenter or with the bears, suggesting that they might have had a bias based on their decision (Olson & Spelke, 2008), or since they were all tested in a preschool environment, this could lead to a self-presentational bias, such as whether their resource decision is known to other members of the group or not (Shaw, Montinari, Piovesan, Olson, Gino & Norton, 2014). Additionally, it could also be that children are bound to make more equitable decisions with a friend than with a non-friend peer or a stranger

(Moore, 2009; Paulus & Moore, 2013). All the previous possibilities of why our study was not consistent with studies of the same nature (Baumard, et al., 2012, Baumard, et al., 2013), might explain our results, but since it is also probable that they may have also encountered the same kind of concerns these interpretations are highly unlikely.

Italy and Colombia are in very different socio-economical situations. Although our study did not test this factor directly, it is possible that socioeconomic status (SES) has an impact on children's distributive preferences. As reported on Ardila-Rey, et al. (2009) study, revealing that there were significant differences in 6- to 12-year-olds' moral judgments based on levels of exposure to violence and living conditions (in two different SES's within the same culture). There has also been strong evidence that SES within the same culture has an impact on moral psychology (Nettle, Colléony & Cockerill, 2011). Therefore, for Future cross-cultural work it would be interesting to address these factors in order to gain a finer understanding of within and between cultures differences in children's moral judgments. We could, using a replicated experimental procedure as Baumard, et al. (2012), test children of the same society (Colombian children) with two different SES's (Ardila-Rey, et al., 2009), to see if we find a finer and more elaborated explanation to our findings.

Finally, it is normal that in cross-cultural research, the size of each sample once children are split by age and culture is relatively small, this was not the case for our study since we had a rich sample for each age group in both societies, although we did have a difference in number in each age group of both societies. In any case, it does not make a difference since we did not get the results we were expecting even by having a rich sample.

6.5 References

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PART THREE: GENERAL DISCUSSION AND CONCLUSIONS

Chapter 7

7.1 General discussion and conclusion

Is morality innate? I have tested this hypothesis in my research by using equal and unequal resource allocation tasks. We verified the development of the emerging sense of fairness by measuring looking times, anticipatory looks, and manual preference in 15- and 19-month-old infants, with movies with both animated characters and real life characters (see chapters 2 and 3). We revealed that infants are able to evaluate agents' behavior and have an expectation towards an equitable resource distribution, and also preferred a fair distributor over an unfair distributor in the manual choice task. The most plausible interpretation for my results is that moral development involves some degree of innateness. My results, therefore, contribute to the growing body of evidence for moral nativism, some of which will be discussed next. More specifically, they are evidence for the innate tendency to recognize fairness and be concerned of whether or not others behave in a fair manner, in other words, the early emergence of justice.

How can we explain the early emergence of the sense of justice in children? Infants' prosocial behavior, their interest in other's prosocial tendencies, and the capacities underlying these behaviors may serve as the foundation for moral thought and action, and their early emergence supports the view that social evaluation is a biological adaptation, not a cultural product. Prosocial behavior is defined as the voluntary behavior intended to benefit another (See chapter 4). There is a lot of evidence for the early emergence of this behavior, as well as for the fact that children are paying attention to differences in prosocial tendencies in others.

The development of prosocial behavior has been studied as early as the first months of life, bringing extensive research on infants, this period is subject to rapid changes biologically, cognitively and affectively (Brownell & Carriger, 1990; Hay, Castle, Davies, Demetriou &

Stimson, 1999). Infants show a reactive crying in response to the cry of another child (Sagi & Hoffman, 1976) to bring greater distress against the tears of others with respect to their own (Dondi, Simion & Caltran, 1999), behavior that suggests the presence of a biological predisposition to experiment with rudimentary forms of empathy. In addition, children of 9 months react to the emotions expressed by their mothers (Termine & Izard, 1988) and use the emotional signals of the referents to guide their behavior in ambiguous situations (Saarni, Campos, Camras, & Witherington, 1998). Between 12 and 18 months, children react to others' emotions clearly with positive contact and verbal reassurance to mothers and others (Zahn-Waxler, Robinson & Emde, 1992). Another prosocial behavior in early childhood is the sharing of objects as an attitude of comfort against another's "distress" (Hay, 1994) behavior that tends to emerge as early as 8 months (Hay & Rheingold, 1983).

Killen and Smetana (2015), however, claim that the difference between sociality and morality is important for understanding research relevant to the origins of morality. They argue that all social behavior is not necessarily moral behavior; morality is more strict and requires obligations to behave with others a fair way. Mainly, research on the emergence of morality is based on cooperation and prosocial behavior. Since, these behaviors lack a prescriptive and an obligatory basis, it is debatable that they are genuine moral behaviors or merely positive socially oriented behaviors. Research for sociality in infancy is itself a broad field and covers many behaviors, for example, goal-intention behaviors toward others, having positive and reciprocal interactions in family contexts (Dunn, 2014, as cited in Killen & Smetana, 2015) and helping behaviors (Brownell, 2013, as cited in Killen & Smetana, 2015).

From the perspective of moral development, it is important that the early prosocial behavior is not only reaction to stimuli from others, but the children seem to be interested in others' wellbeing as separate individuals. As soon as children start to demonstrate the ability to distinguish

self from others, they tend to be relatively empathetic and show prosocial behavior (Zahn-Waxler, Schiro, Robinson, Emde & Schmitz, 2001). Children are able to take the perspective of others in the second year of life, and have more mind reading abilities in children aged 4 and 5 years, and both of these are positively associated with an increase in prosocial behavior (Zahn-Waxler et al., 1992). In line with what is described above, once children reach a preschool age, the responses available to researchers widen to include verbal reasoning and judgments, spontaneous peer interactions, and responses to social dilemmas in the context of experimental situations.

Another important aspect of prosociality, from moral point of view, is that the children also evaluate the prosocial behavior in others. This is important because morality does not involve only tendency to act in the ways we think are morally right ways to act. It also involves categorizing others' behavior as morally good or bad. Hamlin, Wynn and Bloom (2007) demonstrated this kind of susceptibility to prosociality in 6- to 10-month-olds with a task that involved watching an animation showing the interaction of geometric shapes. This included a circle with eyes trying to climb on a hill twice without success. In one scene, the circle is being helped by a triangle to climb the hill, and in another scene a square hinders the circle's attempt to go up the hill, pulling it down (making both triangle and square different, one acting nicely and the other one not). After observing these scenes, the child is asked to choose which figure they prefer between the triangle and the square shown in the scenes. Results show an important preference for the circle that showed prosocial behavior (chapter 5).

In another experimental setting, instead of the manual choice task, the child is shown an animated movie scene where they see the circle that is next to the triangle or square. The results show that children observe the scene that violates their expectation for a longer period. This time, they preferred the circle approaching the triangle, which means that they choose the one who have helped before over the one who had hindered. There are other similar studies that use puppets

instead, in which infants demonstrate prosocial intentions rather than antisocial intentions by which puppets they reach for (see Hamlin, 2013 for a review). These prosocial orientations, as measured by visual preference and reaching behavior, are taken to provide evidence for an innate basis for morality. Research by Warneken and Tomasello (2009) reveal that 14-month-olds are willing to help an adult stranger to do a series of tasks when the adult seems to be distressed or confused. Furthermore, these behaviors are not performed simply to obtain external rewards. These findings provide evidence that responses to another's concern present early in development. Research with older infants reveals that they evaluate moral and non-moral social interactions differently (Smetana, 1984), claiming that a sense of obligation should already be present at this time.

In other studies, 18-month-olds show altruistic behavior, manifested in the form of instrumental help towards an individual who fails to achieve his or her aim, such as grasping a desired object placed out of his or her reach; interestingly, chimpanzees show similar tendencies, which is evidence for the evolutionary roots of this behavior (Warneken, Hare, Melis, Hanus & Tomasello, 2007). This clearly demonstrates the ability to implement helping behavior directed towards an individual.

Prosocial behavior is the product of the interaction between individual variables and contextual determinants. The individual variables include the ability to feel empathy, emotion management, security and a sense of personal self-efficacy, and certain personality traits. Contextual variables which play an important role include the cultural influences from the specific culture (Grusec, 1991): the social and cultural values of reference, the education given by the parents, especially the style of education and parental model (Grusec, 1991; Zahn-Waxler et al., 1992), and the influence from the peer group, the education system and teaching methods related to the school experience (Bonino and Reffieuna, 1999). Even if it is based on an innate basis, prosocial

behavior, in order to develop, needs to be educated in the different contexts of life of children and adolescents.

One of the more important issues concerning morality is distributive justice. It is based on principles such as merit, need and equality. The merit-based justice requires that resources are allocated according to the quantity or quality of goods and services produced by an individual's productivity, commitment and competence. The justice based on need requires that resources are allocated according to the needs of people e.g. poverty and disadvantage. Finally, according to the justice based on equality (fairness), everyone should receive a resource evenly (See chapter 6).

Damon (1988) demonstrates the influence of empathy on distributive justice; 4 year-old children have a strong sense of obligation to share with others in social relations and conceive sharing as a matter of right or wrong. The role of empathy becomes evident when children are asked why they share to which they respond with an emphatic justification: "So the other child is happy," "when I do not share anything with him, my friend is sad and wants to cry ". The non-empathic justifications are most frequent for a pragmatic type, like how to avoid a fight. In addition, when requested to explain why stealing is bad, around half of all children between 4 and 8 years old and about 80% of 9 year olds respond with empathic reasons (the damage done to the victim) and not with the fear of punishment.

Additionally, research on the fair allocation of resources reveals that the understanding of the wrongfulness of unfair allocation emerges in infancy and early childhood. Many approaches and methods show that children younger than the age of 6 years have already a preliminary understanding of the importance of distribution of resources equally or equitably (Schmidt & Sommerville, 2011; Sommerville, Schmidt, Yun & Burns, 2013; Geraci & Surian, 2011). The infant cognition research aims to determine how early in development humans can distinguish between

different stimuli that reflect constructs such as morality, even if in a preliminary form. These studies rely on visual habituation and looking time to demonstrate preferential knowledge. In one such study (Schmidt & Sommerville, 2011), infants were presented with a video in which an adult actor (the distributor) sat at a table with two recipients, each having had a plate or glass in front of them. The distributor had a bowl of crackers (in one movie) or a pitcher of milk (in the second movie). After a black occluding screen appeared, which covered the actors' plates and the contents of the bowl or pitcher. The distributor allocated the crackers or milk to each recipient; the black occluding screen concealed the exact amount distributed. On test trials, when the black screen was removed, infants saw either equal outcomes, meaning that each actor had equal amounts of crackers (or milk), or unequal outcomes, meaning that one actor had more crackers (or milk) than the other. Infants showed a significant preference for the unequal outcome over the equal outcome, providing evidence that 15-month-old infants expected resources to be distributed equally to the recipients. In another study, 15-month-olds (Sommerville et al., 2013), with a similar procedure to Schmidt and Sommerville (2011) only this time without continuous resources, were presented with scenes in which a distributor allocated four resources between two recipients. The distributor divided two items between each recipient when making an equal distribution, and gave three items to a recipient and one item to the other when making an unequal distribution. This study showed further evidence that infants were attentive to the outcomes of the task showing a sensitivity towards an equal distribution using VOE.

A study with 16-month-olds Geraci & Surian (2011) revealed that infants use information about how an agent distributes resources to guide their expectations of subsequent social interactions involving distributors and recipients, as well as their own preferences for different kinds of distributors with a manual choice task. Infants looked longer when the agent approached the fair distributor. In addition, when given a manual choice task, 16-month-olds selected the fair

distributor over the unfair one. In studies with 10-month-olds, Meristo & Surian (2013) provided evidence that children at this age have the capacity to evaluate agents based on their distributive actions. Infants looked longer when a reward was given to the unfair distributor showing a violation of infants' expectations towards a fair distribution, and when antisocial actions were destined towards the unfair distributor rather than a fair distributor, showing that infants have an emerging sensitivity to fairness (Meristo & Surian, 2014).

Furthermore, in most allocation contexts it is important to point out that many contextual features are activated, including social relationships, the history of interactions, and group dynamics. Children are not demonstrating only their moral tendencies, but these tendencies are mixed with other prosocial tendencies that we may not want to call moral as such. Presenting these features in test settings, young children react to these social dimensions in their resource allocation decisions, too. Research by Olson and Spelke (2008) revealed that friendship status affected 3-year-olds' allocations; younger children allocated equally resources to puppet friend more often than a non-friend did, showing the significance of including relationship contexts and interaction features in this research. Morality is one aspect of social situations, and for the study of development of morality, it is important to see how children learn to balance between different impulses in social situations. Additionally, integrating social and moral reasoning may help us observe why children favor one type of choice over another. This, integrated study of morality and other social tendencies and capacities, would be a theoretically interesting direction for further study of moral development in children.

My results, presented in this thesis, are adding to the growing body of evidence for innateness of several central moral capacities and behavioral dispositions. But my research is also showing some faults in some of the previous studies that have tried to demonstrate innateness. Another study on children's reasoning about resource allocation tried to show that children under 6

understand equality and merit. Baumard, Mascaro, and Chevallier (2012) concluded that they have shown a rudimentary understanding of merit in children as young as 3-year-olds. The study initially focused on effort when children were given the chance to distribute a large or small cookie to a hard-working child or a lazy one, children were able to distribute the amount of the resource with greater effort. Although, in a second experiment, children preferred to distribute cookies equally when this option was made available. In fact, only a small minority of children explicitly used merit as the reason for their decision. Furthermore, as shown in chapter 6 of my thesis, we tried to carry out a study using a similar experimental procedure (ours with bears and acted out instead of vignettes), only this time we studied children of two different cultural environments (Italian and Colombian). We did not find that children as young as three, or up to six, of two very different societies are able to consider merit or also have an egalitarian choice when given the chance. Our conclusion from this discrepancy was that our results might be product of procedural errors.

After this broad overview of different studies regarding moral nativism, it is time to return to my initial question: is morality innate? The early emergence of the evaluation of social actions, already in infants, suggests that this capacity cannot result entirely from experience in particular cultural environments (see chapter 1). This suggests that there is an innate base, which grounds some components of our moral cognition. My results are in agreement with the findings described in this chapter. They reflect various innovative research settings and methodologies that seem to give strong evidence for moral nativism. Research in the development of morality has provided theories, evidence, information that helps us understand the origins of justice, fairness, and equity in the early stages of development as something innate rather than acquired.

7.2 Limitations and Future proposals

The previous works present some limits, of which the most important deserve to be visible in order to outline future proposals.

In the first study, 'Do infants evaluate agents' fairness' studying infants aged 9 and 19 months, there were some limits. In the first place, it lacks an experiment to check the perceptual preference for both the agents. The results do not rule out the explanation that children can have preferred an agent, without the option of a resource allocation task. In second place, all agents of the animations were emotionless. The results do not give information if infants may have evaluated the behavior of others, reasoning on emotional reactions. It would be interesting to add a control experiment, where there are obvious emotional reactions of agents, to see if emotions can change the results, revealing the inference of emotions and the role of emotion in the assessments of pro-social actions of others like. As for the procedure, it would be interesting to use a more realistic scenario to see if we are able to pull down the age group (Hamlin et al., 2007; Southgate et al., 2007). For this final motive, the second study was carried out with a real life scenario displayed as a movie, and we had an additional measure to see infants' violation of expectation (adding in the final scene 1 minute to see looking behavior).

In the third study, we studied how infants approach fair and unfair distributors: Do they prefer helping a fair distributor rather than an unfair one? We tried to modify many times the procedure to make it attractive to infants and similar to a study conducted by Dunfield and Kuhlmeier (2010). In any case, we concluded that it might be distracting for children to relate to what was taking place on the resource allocation task, to form an evaluation on which to base their selectivity for a helping behavior.

For the fourth study, On infants' mapping of the word 'good' to moral qualities we added an older age group to see if infants' moral competence in the domain of harm seems to be mapped at 30 months onto an appropriate lexical item. The results reveal that when infants were explicitly asked to pick up the good agent, they were selectively oriented towards the helping agent.

Finally, in the last study, 'Do children consider merit? A cross-cultural study based on Colombian and Italian distributive actions', we encountered a few procedural problems since we were attempting to do a similar procedure to Baumard et al. (2012), with the same aim (see chapter 6).

Future proposals allow us to continue the purpose of this work, in order to investigate the origins and the cognitive development of morality.

7.3 Final Remarks

Justice, fairness, and equity seem to be specific to morality, not general to all social cognition. Children are using moral cognition in situations that involve other considerations, too, but the moral capacities themselves are for no other purposes. This means that these capacities and tendencies are both innate and specifically moral. Thus, morality is innate. In addition to being in agreement with the previous studies that point to nativism, my results are adding new evidence confirming the hypothesis that morality, or central parts of the moral cognition at least, are indeed innate.

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