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Symptoms of conduct disorder and reasons to act prosocially: A reading through evolutionary theories

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Abstract

Based on evolutionary theories, this study analyzes reasons for sharing and retention and the association of these reasons according to age and the presence of conduct disorder symptoms in children. Therefore, the children participated in a prosocial activity, in which they had to decide if they would like to share a prize with his/her classroom best friend. Finally, the experimenter asked them to explain the reasons for his/her decision. The results showed that children considered factors such as reciprocity probability, sharing cost, benefit to the recipient, moral justification and kinship. Furthermore, the conduct disorder symptoms group showed a weak association to social issues and younger children assign greater cost on sharing the prize, compared to older ones. It is possible to understand the reasons provided by the children in the light of evolutionary theories on cooperation, altruism and generosity.
Keywords: altruism; antisocial behavior; behavior disorders; evolutionary psychology; prosocial behavior.

Resumo

Sintomatologia do transtorno da conduta e razões para agir pró-socialmente: Uma leitura através das teorias evolucionistas. Baseado nas teorias evolucionistas, este estudo analisa as justificativas de partilha e de retenção, assim como a associação dessas justificativas com a faixa etária e a presença ou ausência de sintomatologia do transtorno da conduta em crianças. Para isso, as crianças passaram por uma atividade pró-social, na qual decidiam se gostariam de partilhar ou não com seu melhor amigo de classe. Por fim, o experimentador solicitava para que elas explicassem as razões de sua decisão. Os resultados mostraram que as crianças consideraram fatores como: probabilidade de reciprocidade, custo da partilha, benefício para o receptor, justificativas morais e parentesco. Além disso, o grupo com a sintomatologia do transtorno da conduta mostrou uma relação muito fraca com respostas relacionadas a questões sociais e as crianças mais jovens, comparadas as mais velhas, atribuíram maior custo para partilhar os objetos. As justificativas dadas pelas crianças respaldam as teorias evolucionistas sobre cooperação, altruísmo e generosidade.
Palavras-chave: altruísmo; comportamento antissocial; distúrbios do comportamento; psicologia evolucionista; comportamento pró-social.

Resumen

Síntomas de trastorno de conducta y razones para un comportamiento pro-social: Una lectura a través de las teorías evolutivas. Basado en las teorías evolucionistas, este estudio analiza las justificativas del compartir y del retener, así como la asociación de esas justificativas con el rango de edad, la presencia o ausencia de sintomatología de trastorno de conducta en niños. Para esto, los niños participaron de una actividad pro-social, en la cual debían decidir compartir o no con su mejor amigo de la clase. Al final, el experimentador les solicitaba que explicaran las razones de su decisión. Los resultados mostraron que los niños consideraron factores como: probabilidad de reciprocidad, costo de compartir, beneficio para el receptor, justificativas morales y parentesco. Además de eso, el grupo con la sintomatología de trastorno de conducta mostró una relación muy débil con respuestas relacionadas a cuestiones sociales y los infantes más jóvenes, comparados a los mayores, atribuyeron mayor costo para compartir los objetos. Las justificativas dadas por los infantes respaldan las teorías evolucionistas sobre cooperación, altruismo y generosidad.
Palabras clave: altruismo; conducta antisocial; trastornos de la conducta; psicología evolucionista; conducta pro-social.

Generosity is a prosocial behavior that is often present in our day to day. We commonly observe people giving alms, helping a neighbor, donating blood, taking care of a friend's child, among other generous acts. Generosity is defined as a freely given assistance to others, as a disposition; and it is unilateral, emanating from an individual. It can foster reciprocity, cooperation, and benefit the common good, and thus help individuals within groups (Collett & Morrissey, 2007). Studies from the developmental evolutionary psychology have shown that prosocial behaviors, such as generosity and cooperation, are already present among children (Alencar, 2010; Alencar, Siqueira, & Yamamoto, 2008; Hamann, Warneken, & Tomasello, 2012; Olson & Spelke, 2008; Schmidt & Sommerville, 2011). Young children share resources, give instrumental help and offer information to assist others (Warneken & Tomasello, 2009).

One of the factors that seems to modulate prosocial behavior is age; as children get older, they tend to behave more generously. The middle childhood is one of the main stages of the cognitive and moral development. In this stage children develop, for example: increased reasoning and problem-solving skills, acquisition of cultural norms (e.g., prosociality), increased pragmatic abilities and a complex moral reasoning (Del Guidice, 2014b). From an evolutionary perspective, morality is a form of cooperation and as they develop children become truly moral agents. For instance, older preschoolers not just follow norms, but actively seek out what those norms are (Tomasello & Vaish, 2013). Benenson, Pascoe and Radmore (2007) used the dictator game, in which children decided how many stickers they would like to donate anonymously to a classmate, and they found that nine-year-old children donate more than four-year-old children, while six-year-old children donate an intermediate number.

Alencar et al. (2008) performed a game of public goods with Brazilian public school students. In this game, children received an envelope and three candy bars and decided how much they would like to donate anonymously to the group in a sealed urn, retaining the rest of the non-donated candy bars. They were informed that for every donated chocolate the experimenter would add two more and the total would be divided equally among all participants. The results showed differences in the number of donated candy bars according to group size: children donated significantly more when in smaller groups (between five and seven players) than in larger groups (twelve and more players). This result is attributed to a higher chance of surveillance and retaliation in small groups. Alencar's et al. (2008) results suggest that children are reluctant to share, and they do it when there is peer pressure and the possibility of retaliation.

However, even in situations in which there is no surveillance, and therefore no pressure or possibility of retaliation, generosity can occur, for example, if an individual alone helps another with a broken car on an abandoned road. Why share in these circumstances? This seemingly simple question involves a complexity of factors. From an evolutionary perspective, prosocial behaviors represent a dilemma for the theory of evolution proposed by Darwin (1859/1996), which focuses on individual survival and reproduction.

From an evolutionary perspective, humans' dependence on their social groups helps to understand why generosity occurs. Human babies are highly dependent on parental care and they start to establish social bonds at that stage that will favor their survival and reproduction throughout life. In order to maintain group life, it is critical to adopt some prosocial behavior, including cooperation with others (Alcock, 2011). Over and Carpenter (2009) showed that cooperation in children is closely related to human social nature. In that study, 18 months old children increased the frequency of cooperation with an adult, helping the adult to recover objects that had fallen on the floor, when they were previously exposed to an affiliation priming, which contained images of puppets interacting.

Three major theories seek to explain prosocial behavior in the light of evolutionary perspective: kin selection (Hamilton, 1964), reciprocal altruism (Trivers, 1971) and indirect reciprocity (Alexander, 1985). These theories are not mutually exclusive, but rather they add up to explain the complexity of prosocial behavior in different animal species.

The kin selection theory (Hamilton, 1964) suggests that individuals are more generous with their biological relatives when compared to unrelated individuals because, despite the costs of helping, there are benefits in indirect fitness. In other words, by contributing to the survival and/or reproduction (i.e. helping) of someone with whom an individual shares genes (i.e. close relative), the individual increases the likelihood of passing on indirectly his or her own genes.

Considering that individuals cooperate not only with relatives, but often also with friends and acquaintances, the theory of reciprocal altruism (Trivers, 1971) argues that a part of generous behavior can be

explained by the expectation of reciprocity. The cooperative behavior assumes low cost to the cooperator and high perception of benefit to the recipient, as well as enough memory capacity to remember who owes to whom, and the likelihood of the reciprocity.

Alexander (1985) states that cooperative behaviors that do not occur in situations that provide direct reciprocity can also bring benefits to the cooperator. This benefit would not take place in a direct way, but would occur through indirect reciprocity. "Disinterested" help in front of an interested audience makes the individual gain in reputation, being socially rewarded and attracting cooperation (Nowak & Sigmund, 1998; Panchanathan & Boyd, 2003).

Markovits, Benenson and Kramer (2003) conducted a study with elementary, junior and senior high school and undergraduate students and suggest that the pattern of sharing can be seen as a mutual influence of different factors. Participants were exposed to contexts that required sharing (a dessert biscuit in a park, low survival value, or a sandwich in a forest in which the actors are lost, tired, and hungry, high survival value) and distinct degrees of kinship or familiarity with the individual who was beneficiated (a relative - brother, a classmate or a stranger). The results showed that the degree of importance of these factors for the decision was the survival value of the resource, kin relationship, and anticipation of future interaction, increasing with an expectation of a good relationship in the future.

On the other hand, children with symptoms of conduct disorder show a lower rate of cooperation than children without those symptoms (Medeiros, 2014). In this way, considering our dependence on social life and the individual gains coming from prosocial behavior as main factors to answer why we share, we ask: why is there a considerable variation in inter-personal reasons to cooperate? To answer this question, we compared the response of children with conduct disorder symptoms to those of children without those symptoms.

Conduct disorder is a disruptive disorder of impulse control and behavior, more specifically characterized by the violation of the basic rights of others and social norms (American Psychiatric Association, 2014). For American Psychiatric Association (2014), the conduct disorder has three subtypes (starting in childhood, adolescence and unspecified) and three levels of severity (mild, moderate and severe).

The diagnostic criteria for conduct disorder remained unchanged in Diagnostic and Statistical Manual of Mental Disorders V [DSM-V] (American Psychiatric Association, 2014) from the ones in the DSM-IV-TR (American Psychiatric Association, 1995), but the introduction of a specifier of Conduct Disorder with a Callous-unemotional presentation is new. To qualify for this specifier, a child must have displayed at least two of the following four symptoms: (i) lack of remorse or guilt, (ii) callous-Lack of empathy, (iii) unconcerned about performance, and (iv) shallow or deficient affect. The symptoms should be assessed from multiple sources of information, including self-report and reports from significant others who have been able to observe the child's behavior for an extended period of time - parents or other family members, teachers, peers and so on (American Psychiatric Association, 2014).

MacDonald (2012) proposes five sex-differentiated evolved personality systems based on individual differences, which traits combined result in different Conduct Disorder expressions. Individuals who express Nurturance/Pair Bonding System (callous-coldhearted personality trait associated with behavior that victimizes others) and high on Behavioral Approach System (underlying sensation seeking and aggressive pursuit of reward and social dominance) express the most socially destructive combination. Considering the individual differences on prefrontal executive control, when low in prefrontal executive control, such individuals are prone to impulsive aggression that victimizes others; and when high in prefrontal executive control, such individuals are prone to well-planned victimization of others.

In an evolutionary psychopathology perspective, Del Giudice (2014a, 2016) discusses the mental disorders based on the concepts of life history theory (explain the way organisms allocate time and energy to the various activities that comprise their life cycle) and proposes a novel distinction between fast spectrum and slow spectrum psychopathology: individuals with fast spectrum show strategies to seek present rewards and individuals with slow spectrum are oriented by future strategies; this should result in consistent individual differences in risk-related traits. In a life history perspective, the externalizing spectrum disorders, including the conduct disorder, are prototypical instances of fast spectrum psychopathology and can be understood as maladaptive extremes of potentially adaptive traits.

The factors presented here allow us to raise some hypotheses about individual differences in the patterns of sharing or retention in children when interacting with their best friends, considering the presence or absence

of symptoms of conduct disorder and their age. Our hypotheses were: (H1) the reasons for sharing will be driven by low cost to the donor and the reasons for retaining will be driven by high cost to the donor (see Hamilton, 1964; Trivers, 1971); (H2) the sharing and/or retention probability will be adjusted by the reciprocity probability perceived by children (see Trivers, 1971); (H3) children use moral arguments to justify sharing but not retention (see Alexander, 1985); (H4) children with symptoms of conduct disorder will verbalize more about the personal benefit from sharing or not sharing (see Del Giudice, 2014a); and (H5) older children will present moral reasons more often than younger ones (see Del Guidice, 2014b; Tomasello & Vaish, 2013). Thus, the study aims to examine, in the light of evolutionary theories, the reasons given by children to be generous or not with their best classroom friends.

Methods

Participants

The study was conducted in public schools from Natal, Brazil. The sample consisted of 102 children, with age between six and 12 years, 39 girls and 63 boys. The sample was divided by group with Symptoms of Conduct Disorder (Group with Symptoms - GWS) or without Symptoms of Conduct Disorder (Group without Symptoms - GWOS), and by younger children (between six and eight years) and older children (between nine and 12 years): GWS (n = 32; mean age = 9.12) and GWOS (n = 70; mean age = 8.17); younger children (n = 54; GWS = 13) and older children (n = 48; GWS = 19). Participants were separated by the presence of symptoms of conduct disorder and by age group so that we could use these two variables in the analyzes proposed below. The children in the group with symptoms had no diagnosis of conduct disorder; only the signs of symptoms assessed through the instrument used in the research (see Procedures). None of these children were on medication or other therapeutic procedure at the beginning of the study.

Procedures

After Parental Informed Consent, children participated in an activity in which they could share attractive school supplies. In this activity, each child answered individually who was his/her best friend in class. Then, four school supplies (stickers, automatic pencil, colored erasers and crayons) were presented to the child, who was asked to indicate which he/she liked the most. Then he/she chose two items, following his/her order of preference. Finally, it was told to the child that the two favorite items could be his/her since he/she had helped in the research, but as his/her friend was not participating, he/she would not win a school supply. After providing this information, the child was asked if he/she would like to donate one, two or none of his/her materials for his/her best friend indicated at the beginning of the activity. According to his/her decision, the child was questioned about why sharing or why retaining.

Symptoms of conduct disorder were identified through the Teacher's Report Form for Ages 6-18 (TRF/6-18) (Achenbach & Rescorla, 2001). The teachers identified the children they considered to fulfill the criteria of conduct disorder of the DSM-IV-TR (American Psychiatric Association, 1995). Then, they answered the TRF/6-18 for these children, which indicate or not conduct disorder.

Statistical Analysis

We categorized the responses by grouping them according to the similarity of speech. The answers were read by three judges who evaluated their similarity. We ran multiple correspondence showing the association among categories of symptomatology of conduct disorder, age classes and reasons for sharing or retention. For further information about correspondence analysis see Hair, Black, Babin, Anderson and Tatham (2009).

Results and discussion

Responses were grouped into categories by similarity of speech. Tables 1 and 2 show the name assigned to each category of sharing and retention, respectively, and examples of answers grouped into each of them. The names assigned to each category in Tables 1 and 2 show a relation between the answers given by children and evolutionary theories that discuss altruism and cooperation.

In their responses, the children brought elements that support the reciprocal altruism theory (Trivers, 1971), referring to the low costs to the cooperator and the high benefits to the recipient. Children also mentioned moral issues that may be related to the search for reputation, as they support the indirect reciprocity theory (Alexander, 1985). Finally, they also refer to kinship relationships to the recipient, supporting the kin selection theory (Hamilton, 1964). However, mentioning of these motives does not imply a conscious

consideration of fitness benefits; children share because they think their friend is cool or because their friend may cooperate with them in the future.

Table 1. Categorization of the Sharing Answers and Examples

Categories	Examples of Answers
High probability of reciprocity	*"My best friend."* *"He is cool."* *"He shares with me."* *"I like him."*
High benefit for the friend	*"He needs it."* *"He likes it."*
Low cost for the child	*"I already have it."* *"I don't want it."* *"I didn't like it that much."* *"I don't need it."*
Answers with a moral nature	*"It is good to share."* *"It is right to share."* *"I like to help others."* *"It is impolite not to share."*
Answers with kinship	*"She is my cousin."*
Doesn't know why shared	*"I don't know why."*

Table 2. Categorization of the Retention Answers and Examples

Categories	Examples of Answers
Low probability of reciprocity	*"Actually, he is not a very close friend."* *"I don't have real friends."* *"One day he was eating a cookie and didn't share it with me."* *"He already cursed my mother."*
Low benefit for the friend	*"He already has it."* *"He wouldn't like it."* *"She doesn't use these things."*
High cost for the child	*"Because I like them both."* *"There are different things."* *"Because they have different functions."* *"I need it."* *"I've never had any of these."*
Answers with a moral nature	*"I am good in another way."* *"I can borrow it to her."* *"I already give him many things."* *"When he wants it, he can ask me."*
Answers with kinship	*"I will bring for my brother."* *"I will share with my sister."*
Doesn't know why shared	*"I don't know."*

Multiple correspondence analysis were performed to investigate association among motivation categories, age classes and conduct disorder symptoms' presence or absence. The results, presented in the perceptual maps (Figure 1), show different patterns of associations between reasons of sharing and retention and symptoms group or age classes.

When independently analyzing the perceptual maps, we obtained the following results regarding the reasons for sharing (Figure 1a) and retention (Figure 1b):

Direct reciprocity is a good reason for sharing with a friend (Figure 1a). The high probability of direct reciprocity and great benefit for the friend are the reasons that are mostly associated with all four groups: GWS or GWOS, and young and older children (Figure 1a). Mentions to reciprocity were frequently associated with friendship, in accordance to reciprocal altruism theory proposed by Trivers (1971). Three types of reciprocity were suggested by the children: (i) the child is reciprocating a benefit received from a friend in the past; (ii) the child is visualizing a future benefit that this friend can provide; and (iii) the mixture of the two previous forms, probably because these individuals have a high frequency of social interactions that involve exchanging benefits.

Other studies suggest that children consider the probability of direct reciprocity, donating more when they had the chance to get something in return (Chen, Zhu, & Chen, 2013; Fishbein & Kaminski, 1985). Moreover, the donation between close partners increases the probability of reciprocity (Birch & Billman, 1986). Children also consider the value of the reward for those who receive the benefit as a decisive factor in the donations (Silva, 2013). The value of the benefit to the recipient is directly related with a higher probability of reciprocity, since it is enhanced when the recipient assigns a high value to the help (Zhang & Epley, 2009).

The sharing costs are good reasons to share (Figure 1a). The low cost for cooperating is more associated with older children compared to younger ones and to the GWS compared to the GWOS. Thus, the cost of sharing for the donor is an important point in the decision to be generous or not with the friend. Silva (2013) suggests that children assess the value of the object in this selection process and donate less when they perceive the object as more valuable. Moreover, they consider not only the value of the resource itself but also mainly the value according to the context – split a biscuit in a park or a sandwich in a forest (Markovits et al., 2003). House, Henrich, Brosnan and Silk (2012) observed that older children laughed when sharing less items with the receiver, probably because it is contrary to one's expectations. The authors attribute this behavior to the low value placed by older children to the donation item (cheese crackers): children perceived the crackers as something of low value for them and for those who will receive them, so they played along with the situation, retaining the cookies. This effect was not seen in younger children probably because of the

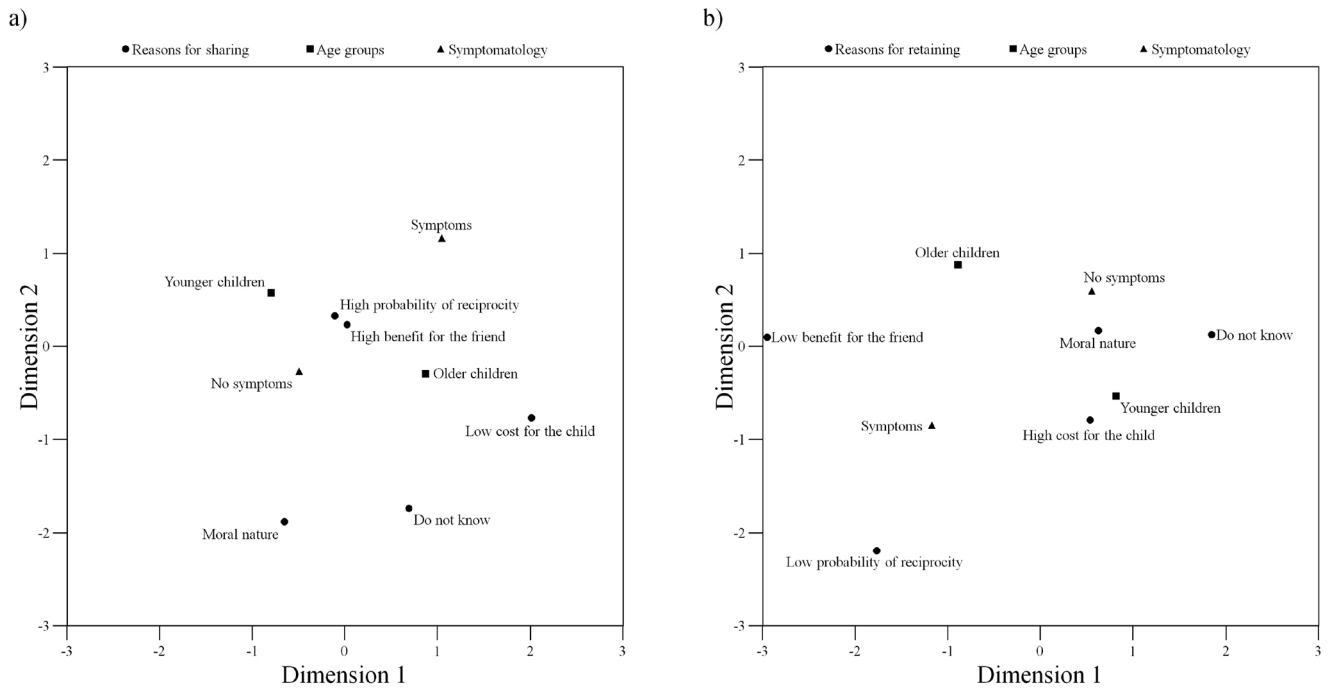

Figure 1. Perceptual Maps of Associations among the Reasons for (a) Shares or (b) Retention Associated with the Group with and without Symptoms and the Age of the Children. Dimensions 1 and 2 Represent the Maximization of the Central Oppositions Between Rows and Columns in the Data.

greater value attributed to the donated item. Sharp (2007) suggests a deficit in the Theory of Mind in the group of children with conduct disorder, signaled by a failure in the Eye Test. Thus, these children would have a hard time separating the wishes of another from their own wishes and desires, attributing a higher cost to sharing. This finding may help to understand why the GWOS assigned a lower cost to the donated object compared to the GWS.

Morality is a good reason to share (Figure 1a). Despite the distance of moral responses from the four analyzed groups, children with symptoms of conduct disorder were farther than the other three groups. The occurrence of responses of a moral nature is probably related to the fact that sharing took place in the presence of an adult. Even though it was previously informed to each participant that he/she could do what he/she thought best and that this information would not be disclosed, the activity was held in front of the experimenter. Therefore, one must consider the influence of the experimenter presence in prosocial behavior (Hoffman, McCabe, & Smith, 1996; Zarbatany, Hartmann, & Gelfand, 1985), knowing that the physical presence of an observer increases the frequency of these behaviors (Burnham, 2003). Part of these results may not correspond exactly to the children's actual wishes or opinions, because it was a verbal report in front of a figure considered as an authority, the experimenter. Monitoring has a strong effect on children and adults, and may occur not only through physical surveillance, but even simple environmental surveillance cues, such as eye images, is enough for people to behave prosocially (Burnham & Hare, 2007; Ernest-Jones, Nettle, & Bateson, 2011; Haley & Fessler, 2005).

In children, the simple belief in an imaginary being decreases cheating (Piazza, Bering, & Ingram, 2011). So, by sharing, children gain the possibility of direct reciprocity (since the donation is directed to a friend), but also gain in reputation, for being generous in front of someone and saying that he/she is sharing "because a friend likes to help his/her friends", for instance. Children may be trying to imply to the experimenter that he/she would help anyone, because they like it or because it is right, not because they expect reciprocity, showing a positive image for their audience and gaining in reputation (Milinski, Semmann, & Krambeck, 2002; Nowak & Sigmund, 1998).

Concern over reputation is discussed in an evolutionary perspective with the probability of indirect

reciprocity (Alexander, 1985). The weak relation between the GWS and the moral nature of the answers may be related to lower social concern in these children. Sharp, Fonagy and Ha (2011) evaluated through the trust game, the behavior of two groups of male teenagers (with or without externalizing disorders) in two different conditions (with or without anonymity). In the trust game, the first player decides how much to keep and how much to donate to the second player. After his/her decision has been made, the experimenter triples the amount donated, and the second player decides how much is his/hers and how much he/she will return to the first player. Teens without externalizing disorders significantly increased reciprocity; the opposite occurred in adolescents with externalizing disorders (among which is the disorder of conduct), with a lower reciprocity rate being showed in this group when in a non-anonymity condition, suggesting a high level of social hostility (Sharp et al., 2011).

The sharing costs and chance of reciprocity are also good reasons not to share (Figure 1b). Low probability of reciprocity distances itself from the four groups studied. However, along with the high cost for the child, those are the reasons that are more strongly associated with the GWS. These results reinforce what has been discussed in this study as the allocation of greater cost to share by the GWS compared to the GWOS. As mentioned above, these findings may be related to a possible deficit in Theory of Mind in children with conduct disorder. The low probability of reciprocity may also be more associated with children in the GWS due to high aggressiveness displayed by these children and its reflection on their ability to make and maintain friends. Highly aggressive children may offend their own friends, getting only short-term friendships (Bukowski, 2003; Poulin et al., 1997), or superficial friendships, which are based on the protection of their group and aggression to others (Gropeter & Crick, 1996). Laghi et al. (2013) found that children with externalizing disorders, including conduct disorder, show a representation of friendship with greater autonomy for partners and greater unbalance of importance between them. These children, even when able to establish a friendly relationship, perceive this relationship in a less positive way, with excessive individualism and propensity to unequal exchanges. Probably for these reasons, children of the symptoms group expect less reciprocity compared to children without symptoms.

Interpersonal bonding patterns may reflect reasons not to share (Figure 1b). There is a greater distance in the answers for low probability of reciprocity both in the GWOS and in the group of older children. These results can be understood considering again the pattern of friendship established by these children. As discussed above, children with symptoms of conduct disorder expect low reciprocity from friends. Children without symptoms of conduct disorder, with low levels of aggressiveness, show a pattern of friendship based on fellowship, equality and reciprocity. Thus, these children have a weak association with low probability of reciprocity. Rubin, Coplan, Chen, Buskirk and Wojslawowicz (2005) review data on friendship in childhood and early adolescence. According to them, with the approximation to adolescence, the bonds of friendship with peers are strengthened, increasing the chances of reciprocity (greater distance from 'low probability of reciprocity' and 'older children').

Differential resource values across developmental groups (Figure 1b). There was a strong association between the answers regarding high cost of sharing and younger children. Unlike older children, who shared because they assigned lower value to the materials in the research, younger children retained the items because they assigned a high value to these objects. This may be due to the type of object chosen for the research – school supplies were probably more attractive for younger children than for older. For instance, in a dictator game, when children decided how many stickers to donate anonymously to a classmate, nine-years-old children donated more than four-years-old, while six-years-old children donated an intermediate amount (Benenson et al., 2007).

Morality is a good reason to retain (Figure 1b). We observed a strong association between moral motives and both the GWOS and that of younger children. We suggest that children give a moral imprint to the reasons for retention as a way of trying to keep a good reputation with the experimenter. Moral motives would stand as a reason for not sharing with the best friend. As seen in reasons for sharing, the group with symptoms of conduct disorder shows a larger distance to responses of a moral nature, due to a lesser concern about social judgment. On the other hand, the GWOS show a greater concern with social judgment from others. The association between the responses of a moral nature and younger children can be interpreted according to Piaget (1932/1994) and Kohlberg (1984), who argue

that children go through stages of cognitive and moral development that change according to the age. Younger children (6-8 years old) are in stage 3 of Kohlberg (1984), in which predominates the good boy figure, the child who cares to match the expectations of others, wanting to be good and right in the eyes of others. Perhaps for this reason, younger children have been keen to show their qualities when not acting in a socially expected manner, that is, when they did not share.

Benefits to others are good reasons for retention (Figure 1b). The low benefit for the friend has a weak association with retention in the four groups analyzed. However, it has a closer approximation to older children and the group with symptoms. The low benefit for the friend seen by older children corroborates what has been discussed in this study: young children perceive the donation as more costly, by valuing more the items used in the research, while older children give a low value to these objects. As for the GWS, the weak association may be due to the difficulty these children have to put themselves in other people's shoes, giving the possible deficit in Theory of Mind (Sharp, 2007).

When they do not know why to share or not to share (Figure 1a and b). Responses "I do not know" were more associated with the older children in reasons for sharing and with younger children in reasons for retention. In both cases, children in the GWS showed a smaller association. Answers such as "I do not know" may have been caused by two reasons: (1) the children do not understand the reason for sharing or retention; or (2) a sense of shame in saying what they really think. One possible explanation for the detachment of children with symptoms of conduct disorder and that kind of answers can be a minor concern with social judgment by these children. Presumably they feel less shame and less fear of the experimenter's judgment when speaking what is on their minds.

Sharing with relatives: although the donation was made in the classroom and directed to friends, there were four cases of children who mentioned the benefits to a relative within what is proposed by the kin selection theory (Hamilton, 1964). Two boys who participated in this research studied with their cousin and sister and decided to share with them, justifying their behavior by the family relationship. Two other children, a boy and a girl, justified the retention, saying that they would keep the items to share them with siblings, who did not study in their classroom. These data were not placed in the correspondence analysis due to the low number of individuals.

Lastly, future studies can investigate the persistence of this pattern of responses, using, for instance, materials more attractive for older children. One point to be investigated would be if adolescents and adults would continue presenting these answers or if they are more restricted to that stage of child development. The use of implicit measures could also be used, avoiding the social bias of the verbal report.

Conclusions

The objective of this study was to examine the reasons given by children with or without symptoms of conduct disorder to be generous or not with their best friend in the classroom, from an evolutionary perspective. Through these results, we found that generosity is not carried out at random by the children, but they can verbalize the reasons to justify a generous behavior repertoire and a selfish behavior repertoire with people close to them, in this situation, with the best friend in the classroom.

According to our first hypothesis (H1), we expected that the reasons for sharing would be motivated by donor's low costs and the reasons for retaining would be donor's high costs. Our results showed that the costs and benefits were considered both on the reasons for sharing and retaining, following the expected pattern: children justified the shares at low cost to the donor and the high benefit to the recipient or the retentions at high cost to the donor and the low benefit to the recipient. Our second hypothesis (H2) predicted that children considered the likelihood of reciprocity, both on reasons for sharing and in the retention of reasons, regardless of age. The reasons given by children corroborate this hypothesis. We also predicted in our third hypothesis (H3) that children would justify their reasons for sharing, but not retaining, based on moral arguments. This hypothesis was partially corroborated, since children based their justifications on moral arguments for both sharing and retaining, in a way to improve their own reputation. Our fourth hypothesis (H4) was that children with symptoms of conduct disorder would verbalize more about the personal benefit from sharing or no sharing. This hypothesis was also corroborated, since the GWS, in the reasons for sharing, have a stronger relationship with the probability of reciprocity, compared to the other answers; and in the

reasons for retention it is the group associated with the answers of low probability of reciprocity. Lastly, our fifth hypothesis (H5) was that older children would present moral reasons more often than younger ones. However, this hypothesis was not corroborated.

In conclusion, children brought to their accounts elements that mostly support what has been proposed by evolutionary theories about prosocial behavior, including generosity. Children consider a set of factors when deciding to share or not some items with a friend, such as: (i) the probability of reciprocity according to the bond of friendship; (ii) the costs and benefits involved in sharing; and (iii) moral issues that perpetuate generosity in the given culture. We suggest that these factors can modulate the decision making of children, whether in sharing or retention. In addition, individual differences also seem to influence the reasons for sharing and retention, such as the presence or absence of symptoms of conduct disorder and the stage of development of each child.

Due to the small number of girls with symptoms of conduct disorder in our sample, we could not evaluate which answer patterns are more associated to each sex. Future studies in this line could help to understand the differences between boys and girls with conduct disorder when they need to take a prosocial decision. Moreover, the verbal report before an authority figure can bias the answers of children, especially those of the GWOS. In this sense, the use of implicit measures in research would allow the evaluation of these responses with less social bias.

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