Cognition 126 (2013) 352–363

Contents lists available at SciVerse ScienceDirect

Cognition

journal homepage: www.elsevier.com/locate/COGNIT

Coalitional psychology on the playground: Reasoning about indirect social consequences in preschoolers and adults

David Pietraszewski [a,b,*], Tamsin C. German [a]

[a] Department of Psychological and Brain Sciences, University of California, Santa Barbara, United States
[b] Center for Evolutionary Psychology, University of California, Santa Barbara, United States

ARTICLE INFO

Article history:
Received 14 December 2011
Revised 24 October 2012
Accepted 25 October 2012

Keywords:
Social cognition
Triadic awareness
Coalitions
Friendship
Conflict
Anger

ABSTRACT

Surprisingly little is known about how relationship information is used predict others' behavior. We examine a key element of this ability—how relationship information is used to anticipate how others will react to events in which they are not directly involved. This requires both using relationship information to modify expected reactions (e.g., friends may be more responsive than acquaintances) and also inference rules for restricting the class of reactions that may be felt or experienced on behalf of others (e.g., uninvolved friends may become angry but cannot become dizzy). These capacities were examined in both preschoolers and adults. Two different events were presented; one that would elicit anger from those who were involved and one that would elicit dizziness. For both sets of participants, cues to relationship status had a strong impact on anger expectations (uninvolved friends were expected to be more angry than uninvolved classmates), but had no effect dizziness expectations (neither uninvolved friends nor classmates were expected to be dizzy). Follow-up analyses also revealed a developmental difference. Adults made distinctions within the uninvolved friends category—expecting friends to be less angry at their own friend, and that levels of anger would vary according to their friend's role within the social conflict—whereas preschoolers did not. These results demonstrate that by the early preschool years sophisticated inference rules already govern the expected reactions of uninvolved others, but that important developmental differences also remain. These results also indicate that relationship representations are inference engines for anticipating others' behavior and reactions, not simply static containers for sorting people into categories.

© 2012 Elsevier B.V. All rights reserved.

1. Introduction

The consequences of social interactions often extend beyond the individuals directly involved. Feuds, riots, and even world wars can be sparked by single events involving handfuls of people. Everyday mundane interactions can spark the ire or admiration of friends and co-workers. Even young monkeys seem to appreciate the capacity of uninvolved others to react, as they will readily take food from an even smaller monkey, but not if that monkey's mother is around (Harcourt & deWall, 1992).

At their core, each of these examples involves an indirect social consequence—a modification of the relationship status between non-interactants. In a canonical example Kyle and Sean are friends. Jerry comes along and hurts Sean. Kyle's relationship with Jerry is now negative, even though Jerry and Kyle did not interact at all (thus it is an indirect, rather than direct, consequence). Indirect social consequences are a broad phenomenon (i.e., not restricted to just friendships and negative events), are a defining feature of coalitional (multi-person) dynamics, and are not reducible to the dynamics of dyadic social interaction (Harcourt, 1988).

* Corresponding author. Present address: Department of Psychology, Yale University, Box 208205, New Haven, CT 06520-8205, United States. Tel.: +1 203 436 1415; fax: +1 203 432 7172.
E-mail address: david.pietraszewski@yale.edu (D. Pietraszewski).

0010-0277/$ - see front matter © 2012 Elsevier B.V. All rights reserved.
http://dx.doi.org/10.1016/j.cognition.2012.10.009

Representing indirect social consequences—predicting them ahead of time and keeping track of them once do they occur—is crucial for predicting others' behavior, and maintaining up-to-date representations of the social world. Yet little is known about the underlying psychological processes that make this competence possible and how it emerges over the course of development (for the most closely related work see Bennett, Yuill, Banerjee, & Thomson, 1998; Lickel, Miller, Stenstrom, Denson, & Schmader, 2006).

1.1. Reasoning about indirect social consequences

Pre-existing relationships strongly determine reactions from uninvolved others. This means that the psychology responsible for generating inferences and expectations about uninvolved individuals should be sensitive to cues of relationship status and when detected, should modify expectations of how strongly, and in whose favor, an uninvolved individual is likely to react.

Moreover, in order to form coherent and useful expectations, the inferences that follow from the perception of these relationship cues—and that govern expectations of indirect social consequences in general—must be highly selective and restrictive. Going back to the example above, suppose Jerry punches Sean and as a result Sean feels pain. Both Sean and his uninvolved friend Kyle will feel anger (directed at Jerry), but only Sean will feel pain. This illustrates that while some states and reactions may be shared simultaneously by both the involved and uninvolved friend, others will be restricted to the directly involved person. These and other fundamental differences suggest that the underlying rules for reasoning about uninvolved people cannot just be the same as those for reasoning about the people directly involved in some event. Instead, inference rules are necessary which, by virtue of their structure, specify the class of reactions that are, and are not, expected to be experienced by uninvolved others. (Additional rules for modifying the expected strength of these reactions are also likely necessary).

1.2. Current studies

The current studies investigate this ability to reason about indirect social consequences in preschoolers and adults, examining if both populations use relationship information to selectively modify their expectations of how third parties will react to events in which they are not directly involved. There are two primary goals: (1) To establish if young children have any sense of indirect social consequences, and if they do, to verify that this awareness is not driven by either an experimental artifact or by overly-simplistic rules, and (2) to empirically examine the adult-state capacity to reason about indirect consequences.

Demonstrating the ability to reason about indirect social consequences requires demonstrating that participants use relationship information to selectively modify their expectations of certain reactions and not others. To test for this, participants were presented with vignettes in which two characters were directly involved in a particular event, while two other characters were not. Information about the relationship between the involved and uninvolved characters was manipulated between-subjects. For half of participants, these were described as friends and were shown playing together cooperatively. For the other half, these were described as classmates and shown engaging in parallel activities, but not interactively and at a distance from one another. Next, all participants were shown two different events—one an anger-inducing event and the other a dizziness-inducing event. The anger-inducing event was a social conflict in which one character took a toy away from another, leading to a fight. The dizziness-inducing event involved two characters spinning on playground equipment.

After viewing the social conflict, participants were asked to indicate who they expected would be angry, and could nominate any and all of the characters. If participants modify their expectations of uninvolved others based on relationship information, then there will be a difference between the friend and classmate conditions; uninvolved friends will be expected to be more angry than uninvolved classmates. However, this difference should be restricted to only the uninvolved characters. There should be no effect on judgments of the characters directly involved (all of whom should be expected to be angry, regardless of whether friends or classmates are watching nearby). Including both the directly involved and uninvolved characters as response options allowed us to examine if relationship information in fact only impacts judgments about the uninvolved characters.

An understanding of indirect social consequences will lead participants to make the same judgment about the involved and uninvolved friend; that both will be angry. However, participants (and preschoolers in particular) may also be arriving at this answer for the wrong reasons. For instance, although there is evidence that children have first-person knowledge and experience with friendship (Berndt & Perry, 1986; Costin & Jones, 1992; Grammer, 1992; Newcomb & Bagwell, 1995; Strayer & Noel, 1986), little is known about how children use relationship cues to reason about third-parties. It would be possible for children to entertain large classes of overly broad and simple rules for reasoning about third-party reactions, such as "friends always experience internal states on behalf of one another", or that "friends are interchangeable with respect to their reactions to events", and these would also generate the expectation that both the involved and uninvolved friends would be angry in response to the social conflict. These would make it appear that children are able to reason about indirect social consequences, while not actually being able to do so. Worse still, friendship may simply be more important and salient, and therefore participants would be more likely to confuse one friend for another in memory. In which case the attribution of anger to the uninvolved friend would reflect an accidental experimental artifact, rather than reflecting reasoning about indirect consequences in a sophisticated and selective way.

To ensure that neither overly simple rules or experimental artifacts could be driving participants' responses, a second event was also presented: a dizziness-inducing event, involving the two other characters spinning on

playground equipment. After viewing this event, participants were asked to indicate who would be dizzy. If participants are using relationship information selectively—using inference rules which specify the reactions that are and are not expected to be experienced by uninvolved others—then they should not expect any of the uninvolved characters to be dizzy, regardless of condition. If however they do expect uninvolved friends to be dizzy, this will suggest that they either entertain overly simple rules governing indirect social consequences, or that they have simply confused one friend for another in memory.

In the fully mature competence, then, there should be an interaction between these two manipulations: Uninvolved friends should be expected to be more angry than uninvolved classmates when witnessing a social conflict, but neither uninvolved friends nor classmates should be expected to be dizzy when witnessing spinning on playground equipment. Moreover, these effects should only occur for the uninvolved characters; there should be no impact on relationship status or event type for the directly involved characters (all of whom should be expected to be angry and dizzy, regardless of whether there are friends or classmates watching nearby).

Finally, to examine and characterize the more sophisticated features of this capacity to reason about indirect consequences, the social conflict vignette (for both children and adults) also included an additional dimension that could be examined in follow-up analyses: the role of each directly involved character within the social conflict. One character was presented as an aggressor, one as a victim. This allowed us to examine if these roles further modify participants' expectations.

2. Method

2.1. Participants

To examine children's ability to anticipate the reactions of uninvolved others from a third-person perspective, stimuli were presented to 42 children (21 male, 21 female, M_{age} = 4 years; 9 months; Range = 3;5–5;9; SD = 7.46 months) at their preschool.[1] The same stimuli were also presented to 58 undergraduates (23 male, 35 female, M_{age} = 19.82 years, SD = 2.04 years) who participated for course credit.

2.2. Design

The relationship between the involved and uninvolved characters—friend versus classmate—was manipulated between-subjects. Half of the participants were shown a classmates relationship (17 preschoolers, 27 adults) and the other half a friends relationship (25 preschoolers, 31 adults). The nature of the precipitating event—social conflict versus spinning on playground equipment—was manipulated within-subjects, such that each participant saw and answered questions about both events.

[1] Preschools were drawn from the greater Goleta and Santa Barbara areas encompassing lower to upper middle-class residential neighborhoods.

2.3. Materials and procedure

2.3.1. Preschoolers' procedure

Individual children participated during play time at a table next to their classroom or playground. A trained experimenter presented the story as a narrated picture book and recorded responses. Children were always presented with characters of their own sex.

2.3.2. Adults's procedure

Adults participated in a laboratory room in groups of up to 10. Before starting, it was explained that the story they would be seeing was designed for young children. All adults were shown the girl character version of the story. Everything presented aurally to the children was presented aurally and/or in text to the adults via Powerpoint presentation. Adults indicated their answers on paper.

2.3.3. Story part 1: presentation of pre-existing relationships

The first part of the story introduced two pairs of friends (or classmates, depending on condition). A full body drawing of one character was presented, along with that character's name. A second character was then introduced on the next page. These two characters then appeared side by side on the third page and the experimenter either explained that they "are friends" or "are preschoolers" (see Fig. 1). On the following page the two were depicted either playing together with blocks in the friends condition or, in the classmates condition, as both sitting down for naptime in the same classroom, but not in proximity. These scenes were also described aloud along with the information that "they spend most of their time together" (friends condition) or "they spend most of their time in the same classroom" (classmates condition). Next, a page showing the two side by side again appeared, and now children were asked "Are these two friends/classmates?" After responding, children were asked to recall what the two had been doing in the previous scene. Nearly all children were correct (N = 39), and if incorrect or uncertain (N = 3), the experimenter went back to the prior page and repeated the story. A second set of friends/classmates were next introduced in the same way. In the friends condition, this second pair of characters played a game of throwing balls into a box, while in the classmates condition the two were shown eating at different tables in a classroom (see Fig. 1).

Low-level features of the presentation were matched across the friends and classmates conditions. Each introduced dyad was presented as sharing a common lexical label in both conditions, (i.e. "both friends" or "both preschoolers"). Each dyad appeared on the same page an equal number of times, and also shared the same activity (albeit in one case in parallel, and in the other, cooperatively). The only difference was the shared lexical label and the degree of cooperation and proximity between the characters (see Fig. 1). After the two sets of dyads were presented all four characters were shown in a schoolyard scene. In the friends condition one dyad played on a swing set, the other, on a single drum. In the classmates condition one child played on the swing, one played on the drum, one played with a ball, and one looked under a rock (or

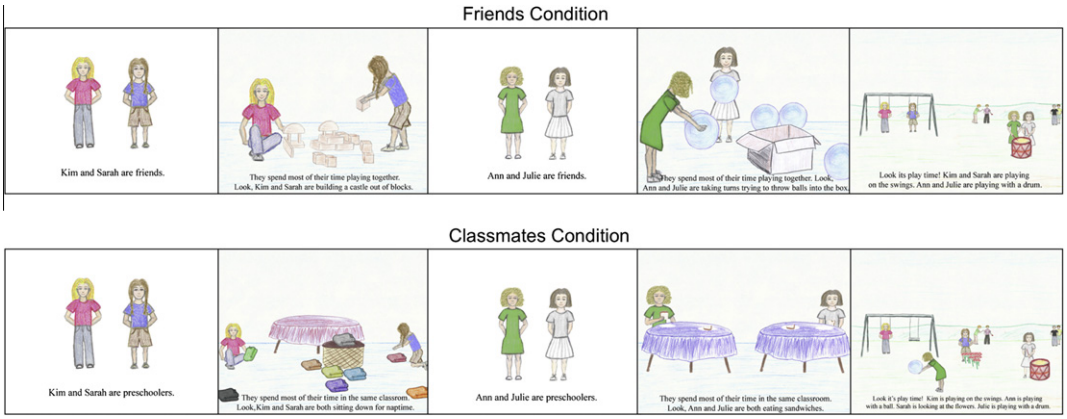

Fig. 1. Schematic of Story part 1: presentation of pre-existing relationships. Friends and classmates conditions are between-subject. See Appendix for stimuli text.

at flowers). This reinforced that friends were proximate to each other and cooperatively engaged in the same activities at the same time, and that the opposite was true for the classmates (see Fig. 1). Next, all participants were presented with two vignettes: First, a social conflict, and second, a dizziness control.

2.3.4. Story part 2: social conflict

The social conflict involved one member from each of the two previously introduced dyads. One character pushed the other, taking their toy, leading to a struggle. Immediately afterward, all four characters were shown and participants were asked to indicate who was fighting by pointing (see Fig. 2). If uncertain or incorrect, the experimenter went back to the slide and repeated the information.

Next, the experimenter pointed out one of the two characters directly involved in the fight, "This is Kim.", and then asked "Who is mad at Kim?". Children's initial pointing responses were recorded. The experimenter then asked "Is there anyone else?" Children either (1) continued to point at additional characters, after which the experimenter again asked "Is there anyone else?" or (2) indicated 'no' either verbally or non-verbally, or simply did not point at any additional characters, at which point the experimenter continued onto the next question. This iterated questioning procedure was used for the preschool participants to preempt communicative pragmatics of providing minimal information. (For instance, it would be wholly correct for children to only indicate that the characters involved in the fight would be angry, even if they anticipated that the uninvolved characters would also likely be affected). Since it was used for each question, and in both the 'friends' and 'classmates' conditions, this procedure cannot account for any differences found within the child data. Adult participants were not given this iterated questioning procedure, as, given their experience with such tasks in a university setting, it was anticipated that adult undergraduates would understand the question as a request to provide all necessary and sufficient information. This procedure was held constant for all of the adult conditions, and so cannot account for any differences found within the adult data.

Next, the experimenter pointed out the second character directly involved in the social conflict, asking the same series of questions and following the same iterated questioning procedure used for the previous question ("This is Julie."; "Who is mad at Julie?"... "Is there anyone else?"). Participants' pointing responses were recorded.

In response to each "Who is mad at X?" question, participants could nominate any of the three other characters. One was directly involved in the conflict and the other two were not. Since there were two "Who is mad at X?" questions in total, participants could in total nominate up to

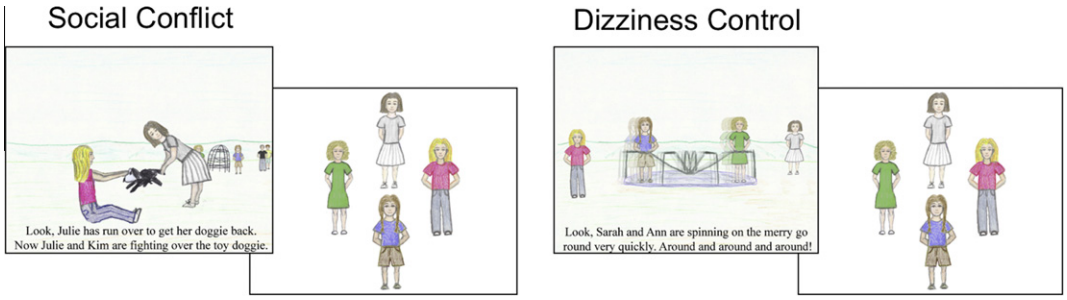

Fig. 2. Schematic of Story parts 2 and 3: social conflict and dizziness control, followed by response pages. Each participant saw both vignettes. See Appendix for stimuli text.

two directly involved characters and up to four uninvolved characters. Combining the answers to these two anger questions in this way provides an overall measure of anger expectations; of who is expected to be angry. Anger directed at a particular character—target-directed anger—can also be examined by looking at the responses to each of the two questions separately (to examine, for example, if there are different expected reactions towards the character who initiated the conflict versus the character who fought back).

2.3.5. Story part 3: dizziness control

Next, the two characters (one from each dyad) who had not been directly involved in the social conflict were shown spinning on a merry-go-round (see Fig. 2).[2] Children were then shown all four characters, and asked to indicate who had been spinning on the merry-go-round. If uncertain or incorrect, the experimenter went back to the slide and repeated the information. Children were next asked "Who is dizzy?", followed by the same series of "Is there anyone else?" questioning used for the social conflict. Unlike the social conflict, there was only this one question—"Who is dizzy?", rather than two separate "Who is is dizzy at X?...Who is dizzy at Y?" questions (these are nonsensical). Thus—and as noted in the graphs that follow—the number of candidate uninvolved others differs between the social conflict and dizziness conditions (four in the social conflict, two in the dizziness control). Because comparisons will either be made between conditions which will hold this difference constant, or against zero, this difference will not impact any of the analyses that follow. (When the target-specified anger questions are each looked at individually, the number of uninvolved candidates will be the same as in the dizziness control; two).

3. Results

The first analyses combine the responses of the two anger questions in the social conflict to form an overall anger measure, and then examine the overall number of candidate characters chosen to be angry and dizzy in the friends versus classmates conditions. The central question is if there will be an interaction between relationship status and the nature of the precipitating event such that uninvolved friends will be expected to be angry, but not dizzy, and if this occurs both for preschoolers as well as adults.

3.1. Adults' overall responses to the social conflict

3.1.1. Directly involved

The characters directly involved in the social conflict were expected to be angry, and this did not differ by condition, $t(55.97) = .388$, $p = .700$; see Fig. 3. Out of two possible characters, participants nominated an average of 1.70 characters (SD = .541) in the classmates condition, and 1.65 characters (SD = .608) in the friends condition. Both means are substantially greater than zero (classmates: $t(26) = 16.34$, $p < .001$, $d = 3.15$; friends: $t(30) = 15.06$, $p < .001$, $d = 2.71$). Seventy-four percent of participants in the classmates condition expected both characters to be angry. Seventy-one percent of participants in the friends condition expected both characters to be angry.

3.1.2. Not involved

As predicted, expectations for the characters not involved in the social conflict did differ by condition, $t(53.40) = 3.01$, $p = .004$, $d = .78$. Adults expected that a greater number of uninvolved characters would be angry in the friends condition ($M = .839$, SD = .860) than in the classmates condition ($M = .259$, SD = .594). Both means are statistically different than zero (friends: $t(30) = 5.43$, $p < .001$, $d = .98$; classmates: $t(26) = 2.27$, $p = .032$, $d = .44$). Fifty-five percent of participants in the friends condition expected at least one uninvolved character to be angry. Nineteen percent of participants in the classmates condition expected at least one uninvolved character to be angry. In sum, adults expected uninvolved friends to be more angry than uninvolved classmates.

3.2. Adults' overall responses to the dizziness control

3.2.1. Directly involved

The directly involved characters were expected to be dizzy, and this did not differ by condition, $t(55.77) = 1.04$, $p = .304$; see Fig. 3. Out of two possible characters, participants nominated an average of 1.85 characters (SD = .362) in the classmates condition, and 1.74 characters (SD = .445) in the friends condition. Both means are substantially greater than zero (classmates: $t(26) = 26.58$, $p < .001$, $d = 5.12$; friends: $t(30) = 21.80$, $p < .001$, $d = 3.92$). Eighty-five percent of participants in the classmates condition expected both characters to be dizzy. Seventy-four percent of participants in the friends condition expected both characters to be dizzy.

3.2.2. Not involved

Unlike the social conflict results, expectations of the uninvolved characters in the dizziness control did not differ by condition, $t(55.60) = .869$, $p = .389$; see Fig. 3. Adults did not expect the uninvolved characters to be dizzy (out to two possible, $M = .11$, SD = .320, in the classmates condition, and $M = .194$, SD = .402, in the friends condition). The mean in the classmates condition was not significantly different from zero, $t(26) = 1.80$, $p = .083$, $d = .35$, whereas despite its small value, the mean in the friends condition was, $t(30) = 2.68$, $p = .012$, $d = .48$). Eleven percent of participants in the classmates condition and 19 % of participants in the friends condition expected an uninvolved character to be dizzy.

3.3. Preschoolers' overall responses to the social conflict

3.3.1. Directly involved

Children expected the characters directly involved in the social conflict to be angry, and this did not differ by condition, $t(31.84) = .103$, $p = .918$; see Fig. 4. Out of two possible characters, participants nominated an average of 1.82 characters (SD = .528) in the classmates condition, and 1.84 characters (SD = .472) in the friends condition.

[2] The logic of this control condition was adapted from Baron, Dunham, Banaji, and Carey (2007).

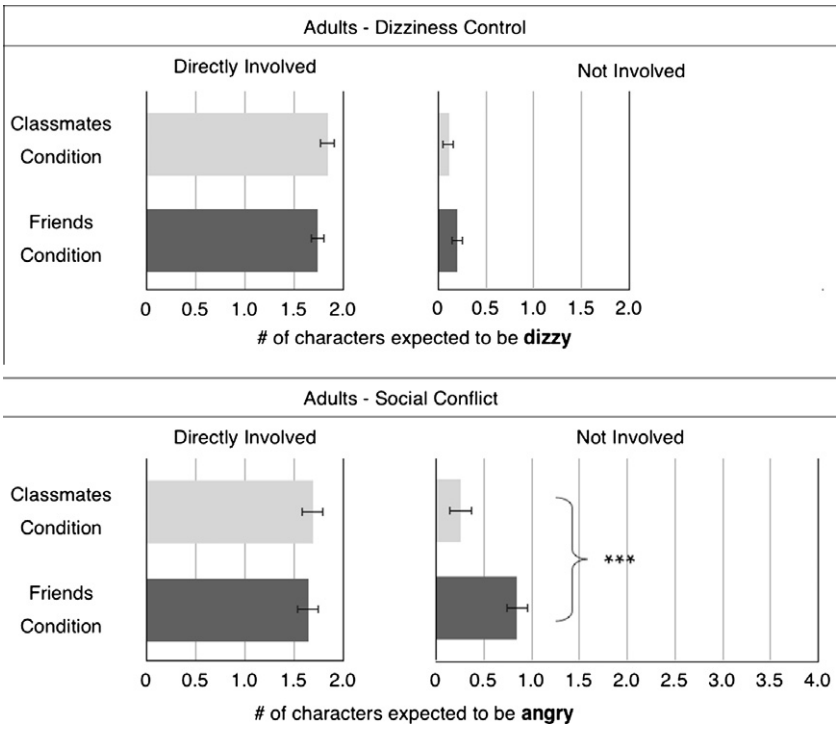

Fig. 3. Average number of characters nominated to be angry and dizzy by adult participants, broken up by condition. (Because the anger responses were combined in this analysis, uninvolved characters who might be angry was out of four, whereas those who might be dizzy was out of a possible two. See Fig. 5 for the uncombined anger analysis out of two). (±1 standard error; $^{***}p < .001$).

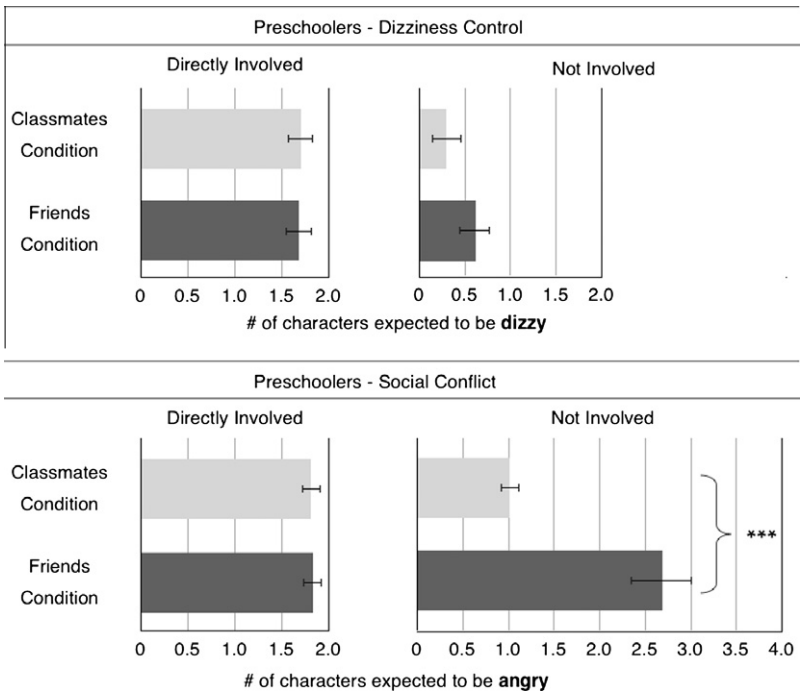

Fig. 4. Average number of characters nominated to be angry and dizzy by preschool participants, broken up by condition. (Because the anger responses were combined in this analysis, uninvolved characters who might be angry was out of a possible four, whereas those who might be dizzy was out of a possible two. See Fig. 6 for the uncombined anger analysis out of two). (±1 standard error; $^{***}p < .001$).

Both means are substantially greater than zero (classmates: $t(16) = 14.22$, $p < .001$, $d = 3.45$; friends: $t(24) = 19.47$, $p < .001$, $d = 3.89$). Eighty-eight percent of participants in the classmates condition expected both characters to be angry. Eighty-eight percent of participants in the friends condition expected both characters in the fight to be angry.

3.3.2. Not involved

Like adults, children's expectations for the characters not involved in the social conflict did differ by condition. Children expected that a greater number of uninvolved characters would be angry in the friends condition ($M = 2.68$, SD = 1.55) than in the classmates condition ($M = 1.00$, SD = 1.41), $t(36.52) = 3.64$, $p = .001$, $d = 1.18$; see Fig. 4. Both means are statistically different than zero (friends: $t(24) = 8.66$, $p < .001$, $d = 1.73$; classmates: $t(16) = 2.92$, $p = .010$, $d = .71$). Eighty-eight percent of children in the friends condition expected at least one uninvolved character to be angry. Forty-one percent of children in the classmates condition expected at least one uninvolved character to be angry.

3.4. Preschoolers' overall responses to the dizziness control

3.4.1. Directly involved

Children expected the directly involved characters to be dizzy, and this did not differ by condition ($t(39.52) = -.13$, $p = .897$). Out of two possible characters, participants nominated an average of 1.71 characters (SD = .589) in the classmates condition, and 1.68 characters (SD = .690) in the friends condition. Both means are substantially greater than zero (classmates: $t(16) = 11.96$, $p < .001$, $d = 2.90$; friends: $t(24) = 12.17$, $p < .001$, $d = 2.43$). Seventy-seven percent of participants in the classmates condition expected both characters to be dizzy. Eighty percent of children in the friends condition expected both spinning characters to be dizzy.

3.4.2. Not involved

Children did not expect any of the uninvolved characters to be dizzy, and this did not differ by condition (out of two possible, $M = .294$, SD = .686, in the classmates condition, and $M = .600$, SD = .913, in the friends condition), $t(39.53) = 1.24$, $p = .223$; see Fig. 4. The mean in the classmates condition was not significantly different from zero, $t(16) = 1.78$, $p = .096$, $d = .43$, whereas the mean in the friends condition was, $t(24) = 3.29$, $p = .003$, $d = .66$), as it was for adults (and, as with adults, the magnitude of this affect was relatively small). Eighteen percent of participants in the classmates condition expected an uninvolved character to be dizzy. Thirty-two percent of participants in the friends condition expected an uninvolved character to be dizzy.

3.5. Overall responses; summary

Analysis of both adults' and preschoolers' responses revealed an interaction between relationship status and the nature of the precipitating event. Relationship status had no impact on expected reactions to the dizziness event, but had a strong impact on expected reactions to the social conflict. Uninvolved friends were judged as much more likely to be angry than uninvolved classmates. Neither uninvolved friends nor classmates were expected to be dizzy.

3.6. Analysis of target-specific anger

In the social conflict questioning procedure, participants were asked about anger directed at a particular character—"Who is mad at Kim?" and "Who is mad at Julie?". The previous analyses combined the responses to these two questions to form an overall anger expectation measure. These questions will now be examined separately.

This analysis affords a more fine-grained analysis of preschoolers' and adults' reasoning about indirect social consequences. In particular, of the characters directly involved in the social conflict story, one character had possession of a toy before a second character pushed them and ran away with it, leading to a struggle over the toy. This means that one of the directly involved characters was an aggressor and the other a victim. Thus, the two separate anger questions amounted to asking participants "Who will be angry at the aggressor?" and "Who will be angry at the victim?". Examining each target-specific anger response allows us to examine if expectations of anger directed at an aggressor are different than expectations of anger directed at a victim.

3.6.1. Adults

Fig. 5 shows adult participants' responses to the social conflict broken up by the two separate questions—"Who is mad at the aggressor?" and "Who is mad at the victim?". Nominated characters are labeled according their role within the social conflict (e.g., the associate of aggressor in the friends condition would be the friend of the aggressor, the associate of the aggressor in the classmates condition would be the classmate of the aggressor). These labels were not included in the experimenter's questions, nor in the participants answers during the study (participants were not asked "Who is mad at the victim?", but rather "Who is mad at Julie?", and they answered by pointing to or circling the image of a character, not by saying "the friend of the aggressor").

3.6.1.1. Directly involved. The characters directly involved in the fight were expected to be angry with the one another (see Fig. 5; top half). The victim was expected to be angry at the aggressor (classmates condition: $M = .89$, SD = .32; $t(26) = 14.42$, $p < .001$, $d = 2.78$; friends condition: $M = .94$, SD = .25; $t(30) = 20.86$, $p < .001$, $d = 3.76$) and, to a slightly weaker degree, the aggressor was expected to be angry at the victim (classmates condition: $M = .81$, SD = .40; $t(26) = 10.70$, $p < .001$, $d = 2.06$; friends condition: $M = .71$, SD = .46; $t(30) = 8.56$, $p < .001$, $d = 1.54$). There was no difference between the between subjects friends or classmates conditions: Victims were just as angry at aggressors when classmates were nearby as when friends were nearby ($t(48.9) = .61$, $p = .544$). Aggressors were just as angry at victims when classmates were nearby as when friends were nearby ($t(55.9) = .93$, $p = .354$).

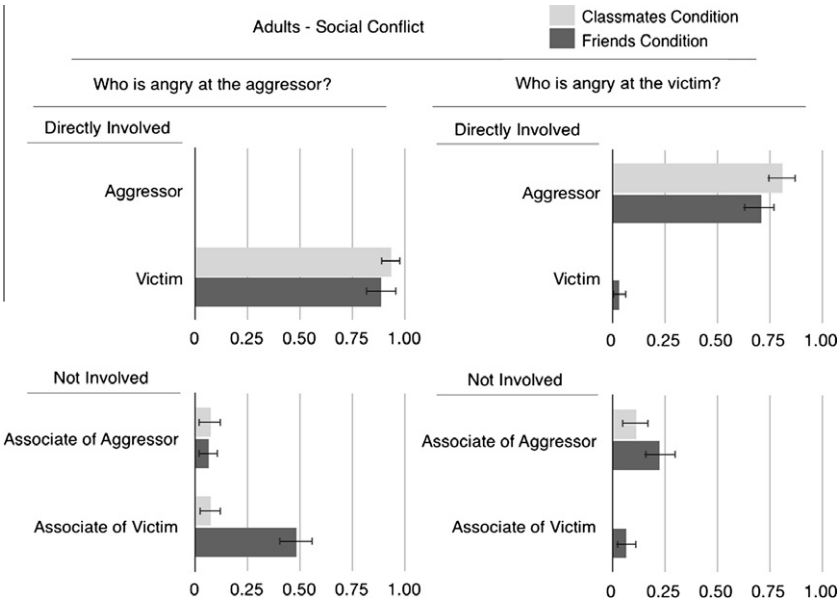

Fig. 5. Adults' expectations of target-specific anger in response to the social conflict. *X*-axis indicates the average number of nominations. Target of anger is either aggressor or victim. Characters are identified according to their role in the story (i.e., associate of aggressor in the classmates condition is the classmate of the aggressor). (±1 standard error).

3.6.1.2. Not involved. Adults' expectations of the uninvolved characters reactions were strongly influenced by the roles of aggressor and victim (see Fig. 5; bottom half). Out of four possible nominations, the expectation of anger in the friends condition was carried by only two: (1) That the friend of the victim would be angry at the aggressor ($M = .48$, SD = .51; $t(30) = 5.30$, $p < .001$, $d = .91$) and (2) to a lesser degree, that the friend of the aggressor would be angry at the victim (the victim was, after all, still fighting with their friend; $M = .23$, SD = .43; $t(30) = 2.96$, $p = .006$, $d = .53$). There was no expectation that the friend of the victim would be angry at the victim (classmates condition: $M = 0$, SD = 0; friends condition: $M = .06$, SD = .25; $t(30) = 1.44$, $p = .161$, $d = .26$), nor that the friend of the aggressor would be angry at the aggressor (classmates condition: $M = .07$, SD = .27; $t(26) = 1.44$, $p = .161$, $d = .26$; friends condition: $M = .06$, SD = .25; $t(30) = 1.44$, $p = .161$, $d = .26$).

Adults expected uninvolved friends to take their friend's side in the conflict, and to only be angry at the person fighting with their friend. This overall pro-friend stance was affected by victim/aggressor status, such that the victim's friend was more angry at the aggressor than the aggressor's friend was angry at the victim ($t(30) = 4.43$, $p < .001$, $d = 1.62$). This subtle affect reflects the asymmetry in potential costs between supporting an unprovoked attacker versus supporting a victim, even when both situations involve supporting a friend.

3.6.2. Preschool children

Fig. 6 shows the same analysis of the social conflict condition for the preschool participants.

3.6.2.1. Directly involved. Preschoolers' expectations of the characters directly involved in the fight were the same as adults' (see Fig. 6; top half). Characters directly involved in the fight were expected to be angry with the other. (Victim angry at the aggressor; classmates condition: $M = .94$, SD = .24; $t(16) = 16.00$, $p < .001$, $d = 3.88$; friends condition: $M = .96$, SD = .20; $t(24) = 24.00$, $p < .001$, $d = 4.80$). Aggressor angry at the victim: classmates condition; $M = .88$, SD = .33; $t(16) = 10.95$, $p < .001$, $d = 2.66$; friends condition: $M = .88$, SD = .33; $t(24) = 13.26$, $p < .001$, $d = 2.65$). There was no difference between the friends and classmates conditions. Victims were just as angry at aggressors when classmates were nearby as when friends were nearby ($t(29.95) = .27$, $p = .793$) and aggressors were just as angry at victims when classmates were nearby as when friends were nearby ($t(34.49) = .02$, $p = .982$).

3.6.2.2. Not involved. Preschoolers' expectations of uninvolved friends' responses to the social conflict were different than adults'. Like adults, preschoolers expected uninvolved friends to be more angry than uninvolved classmates (the effect also demonstrated in the preceding overall analyses). However, unlike adults, they expected the uninvolved friends to be equally angry at both of the characters involved in the fight—angry not only at the person fighting their friend, but also angry at their own friend. (Friend of aggressor angry at aggressor: $M = .68$, SD = .48, $t(24) = 7.14$, $p < .001$, $d = 1.43$; friend of aggressor angry at victim: $M = .72$, SD = .46, $t(24) = 7.86$, $p < .001$, $d = 1.57$. Friend of victim angry at victim: $M = .60$, SD = .50, $t(24) = 6.00$, $p < .001$, $d = 1.20$; friend of victim angry at aggressor: $M = .68$, SD = .48, $t(24) = 7.14$, $p < .001$, $d = 1.43$.).

Preschoolers also expected uninvolved classmates to be angry to some non-zero degree, although these values are relatively small and their statistical significance marginal. (Classmate of aggressor angry at aggressor: $M = .35$,

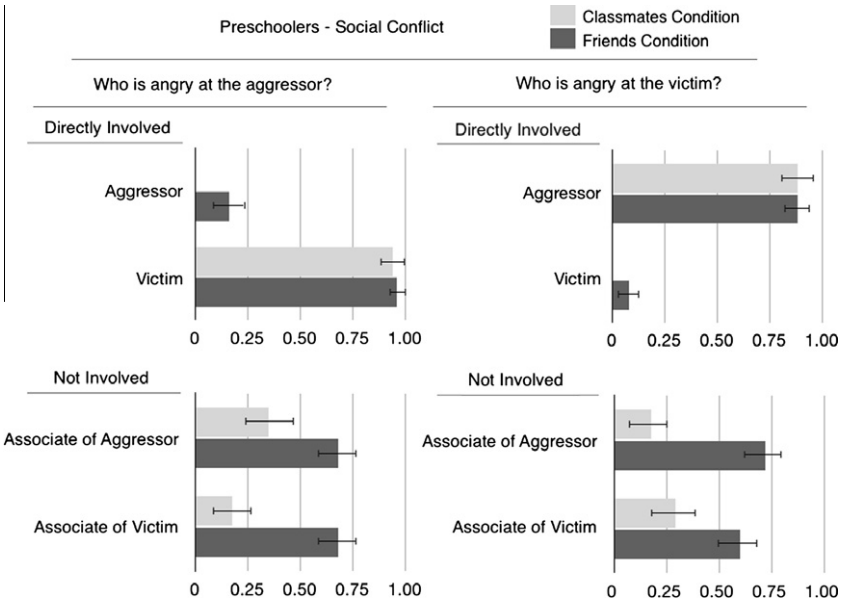

Fig. 6. Preschoolers' expectations of target-specific anger in response to the social conflict. *X*-axis indicates the average number of nominations. Target of anger is either aggressor or victim. Characters are identified according to their role in the story. (±1 standard error).

SD = .49, $t(16) = 2.95$, $p = .009$, $d = .72$; angry at victim: $M = .18$, SD = .39, $t(16) = 1.85$, $p = .083$, $d = .45$. Friend of victim angry at victim: $M = .29$, SD = .47, $t(16) = 2.58$, $p = .02$, $d = .63$; angry at aggressor: $M = .18$, SD = .39, $t(16) = 1.85$, $p = .083$, $d = .45$. Only the first of these four remains significant after Bonferroni correction). In each case (and in accordance with the preceding overall analyses of Section 3.3.2) anger was expected more from the uninvolved friends than from the uninvolved classmates (Friend versus classmate of aggressor, angry at aggressor: $t(33.71) = 2.14$, $p = .04$, $d = .67$; Friend versus classmate of victim, angry at aggressor: $t(38.39) = 3.74$, $p = .001$, $d = 1.18$; Friend versus classmate of aggressor, angry at victim: $t(37.75) = 4.11$, $p < .001$, $d = 1.28$; Friend versus classmate of victim, angry at victim: $t(35.94) = 2.01$, $p = .05$, $d = .63$).

3.6.3. Summary of social conflict expectations

A more detailed analysis of the social conflict conditions revealed a difference between children and adults. Adults expected friends to be biased in favor of their friends—angry at the person fighting with their friend, but not angry at their own friend. This expectation was further modified by the directly involved characters' roles within the conflict: the victim's friend was expected to be more angry at the aggressor, the aggressor's friend was expected to be less angry at the victim. Unlike adults, preschoolers did not expect uninvolved friends to take their friend's side. Instead, they expected uninvolved friends to be angry at both of the characters directly involved in the fight—both at their friend and the person fighting with their friend.

3.6.4. Age effects within the preschool sample

The above comparisons between children's and adults' expectations treated preschoolers as a unitary category, so an additional analysis was conducted to examine if there were any age effects within the preschool sample. A regression of age in months on expectations that a character would be angry in the social conflict revealed a significant negative relationship between age and expectations of anger, but only for the uninvolved characters in the friends condition—precisely the cases in which preschoolers' expectations diverged from adults (friend of aggressor angry at aggressor $\beta = -.429$, $p = .046$; friend of victim angry at aggressor $\beta = -.546$, $p = .009$; friend of victim angry at aggressor $\beta = -.407$, $p = .06$; friend of victim angry at victim $\beta = -.550$, $p = .008$; β's are standardized, SD of age is 7.76 months). These negative regression values indicate that children's attribution of anger to the uninvolved friends decreased with age, in each case toward the direction of the adult-like pattern. However, the overall pattern—that children do not expect uninvolved friends to be biased in favor of their friends—does not change across the range of ages sampled (3;5 to 5;9). Thus, the pattern of children's expectations did not qualitatively change with age.

4. Discussion

Both adults and preschoolers demonstrated the capacity to reason about indirect social consequences. For both sets of participants, the expected interaction between relationship status and reaction type was found. Relationship status (friend versus classmate) had a strong impact on participants' expectations of who would be angry after a social conflict—uninvolved friends were expected to be more angry than uninvolved classmates. However, relationship status had no effect on judgments of who would be dizzy after a dizziness-inducing event—neither uninvolved friends nor classmates were expected to be dizzy.

The effect of relationship status was strong and selective. Participants exposed to cues of positive affiliations (the friends condition) expected anger at over twice the rate of participants who were exposed to cues of indifferent relationships (the classmates condition). The effect size of this difference was substantial for both children ($d = 1.15$) and adults ($d = .78$). This effect was furthermore restricted to only one set of judgments: expectations of anger from uninvolved individuals. Relationship status had no effect on the other three sets of judgments—not on expectations of anger from involved individuals, expectations of dizziness from involved individuals, nor on expectations of dizziness from uninvolved individuals. This strong and selective pattern (see Figs. 3 and 4) demonstrates the operation of relationship and reaction-specific inference processes in both children and adults.

This selective pattern also precludes alternate accounts of these results. First, the attribution of anger to both the involved and uninvolved friends could not have been due to an error—either confusing one friend for another in memory, or losing track of who was and was not involved. If this were happening dizziness would have also been attributed to involved friends. It was not. Several other accounts—such as that children simply find friendship salient, know that it is important, or apply general knowledge that friends should be more empathetic—likewise predict this pattern. Second, applying general knowledge, such as that anger is shared empathetically, but that dizziness is not, would lead one to predict that anger will be attributed to all uninvolved characters, whereas dizziness will not. This did not happen. Anger was only attributed to uninvolved friends, not to acquaintances.

Overall, these results suggest preschoolers are able to reason about indirect social consequences in a sophisticated way, using relationship information to selectively modify their expectations of how third parties will react to events in which they are not directly involved. By the early preschool years children do not expect all internal states to be shared across friendships, nor are they blind to the possibility that friends may react on behalf of other friends.

Nevertheless, important differences between children and adults were also found. Although their overall responses were the same—uninvolved friends were expected to be angry but not dizzy—follow-up analyses of who friends were expected to be angry at revealed a developmental difference. Adults made a distinction within the uninvolved friends category, expecting the victim's uninvolved friend to be angry at over twice the rate of the aggressor's uninvolved friend. This means that adults not only used relationship information to selectively attribute states to uninvolved others, but they also modified the expected levels of these states according to each of friend's role within the social conflict. This was combined with an expectation that each uninvolved friend would be relatively biased on their own friends behalf and would therefore be more angry at the person fighting with their friend than at their own friend (that the friend of the victim would be angry at the aggressor, and the friend of the aggressor would be angry at the victim). In other words, even though the friend of the aggressor was expected to be less angry overall than the friend of the victim, they were expected to direct this anger at the victim, rather than at their friend (see Fig. 5). Children, in contrast, produced a simple, homogeneous expectation within the uninvolved friends category: expecting anger to be uniformly directed at both their own friend and also at the person fighting with their friend, with no difference between the two (see Fig. 6).

Adults' expectations therefore incorporated an additional insight—that the interest of friends do not always overlap. In this scenario, the interests of one pair of friends (the victim and her friend) are much more aligned than they are for the other pair of friends (the aggressor and her friend). The aggressor in the social conflict grabbed a toy from, and inflicted harm on, another person for the purposes of enjoying that toy. Because this violates several implicit social contracts and explicit social norms, disinterested third parties will have a tendency to take the victim's side in this case. This leads to a cost/benefit asymmetry between the friend of the aggressor and the friend of the victim. For the friend of the aggressor, aiding one's friend involves doing something that will be viewed unfavorably by others, all without likely gaining any personal benefits. For the friend of the victim, aiding one's friend involves taking a justified and socially-sanctioned stand against someone who might do the same to you tomorrow, and who, according to the view of disinterested others, is currently doing something negative.

This asymmetry between the of the aggressor and the friend of the victim was reflected in adults' expectations. To our knowledge this is the first experimental demonstration of third-party experimental judgments incorporating the insight that alliance-based loyalty and disinterested assessments can sometimes be in conflict—a key tenet of recent theoretical proposals regarding the nature and function of moral psychology (e.g., DeScioli & Kurzban, 2009). This result is therefore an important point of contact between coalitional and moral psychology, and demonstrates that expectations from a third-person perspective can be a tractable and sensitive dependent measure for future research in both areas.

Unlike adults, children appeared to be applying a more general rule about friendship—that uninvolved friends will be angry when their friends are fighting. This expectation of how third-parties will react differs from what children themselves actually do at this age. Although yielding somewhat contradictory results, observational research of preschoolers' responses to conflict suggests that friends are more likely to intervene in favor of a friend versus a non-friend, and are less likely to intervene against a friend versus a non-friend (Grammer, 1992; cf. Strayer & Noel, 1986). There are several possible reasons for this disparity. One is that there is some developmental delay between first-person capacities and third-person expectations. A second is that that these experimental third-party vignette stimuli exceeded children's performance capacities for reasoning about other, more subtle differences within the 'anger from uninvolved friends' category. Future research not encumbered with other comparisons (friendship versus acquaintanceship, involvement versus non-involvement individuals, and anger versus dizziness) can determine if

this difference between children's and adults' expectations, and between children's own behaviors versus third-person expectations, are the result of competence or performance. (For a parallel discussion of first versus third-person performance in children's moral judgments, see Wainryb, Brehl, & Matwin, 2005).

The results of these target-specific anger expectations reveal several important things about the psychology of indirect social consequences.

First, friends cannot be simply treated as a unit, with the inferences applied to one (the involved friend) automatically applying to the other (the uninvolved friend). This is likely true of other social relationships, including those between groups. If individuals within a relationship (or group) are treated as fully interchangeable with one another, there would be no way to flexibly reason about how much the interests of the directly and indirectly involved individuals are likely to overlap—something adults clearly did in the current studies. This is a strong constraint on future models of the cognitive architecture of relationship and group representation.

Second, reasoning about indirect social consequences is a more complicated problem than just combining knowledge about relationships (friends empathize) and internal states (anger can experienced on behalf of another, dizziness cannot). Instead, these judgments are also modulated by the degree of conflict of interest between the directly involved and uninvolved individuals. Thus, at least three different factors are incorporated into these judgments, and it is likely there are more.

Third, children's relatively general and simple expectations about friendship and anger highlights that the relationship between anger and uninvolved friends is nuanced and learning-intensive. This is because many possible variations between friendship and anger actually exist out in the world. Multiple stable social norms, explicitly or implicitly negotiated, can exist for how friends are going to react to situations. For example, children may come to a friend's aid on the playground, but not when an adult intervenes first. Adults may come to a friends' aid at a social outing, but not at work. A successful prediction system for reasoning about indirect social consequences must take this variability into account. This requires entertaining some range of variation between friendship and anger, and also requires learning systems for establishing what these multiple local norms are and binding the scope of inferences to the appropriate contexts. Needing to learn about individual, relationship, or context-specificity in indirect social consequences requires additional cognitive complexity on top of the other inferences rules already described, and is required throughout the lifespan, not just in childhood.

5. Conclusion

How relationship representations are used to predict behavior has received little attention. The current studies represent an initial step towards understanding this process, examining how relationship representations are used to guide expectations of others' reactions. This capacity is critical not only for predicting behavior, but also for maintaining an up-to-date map of the social landscape and guiding decisions about how to navigate through that landscape.

This perspective—examining what relationship representations are used for—has broader implications for the study of relationship representations and social categories in general. If relationship representations are used to predict others' behaviors and reactions, then much of the time social cognition is not only creating relationship representations and categorizing people into them, but also using these relationship representations. Therefore a complete description of social categories—including relationships representations—cannot only be a description of the entities that fall within each category, but also a description of the inferences that flow from these categorization processes, including those for modelling indirect social consequences. What these are, how they work, and how they develop are important, interesting, and open questions. The unique problems posed by multi-person coalitional dynamics (such as anticipating indirect social consequences) suggest that these will not be derivative of other cognitive systems, but will instead have rules and a logic all of their own.

Acknowledgement

We would like to thank three anonymous reviewers for their helpful comments.

Appendix A. Text of stimuli

A.1. Friends condition

- Kim and Sarah are friends.
- They spend most of their time playing together. Look, Kim and Sarah are building a castle out of blocks.
- Ann and Julie are friends.
- They spend most of their time playing together. Look, Ann and Julie are taking turns tyring to throw balls into the box.
- Look it's play time! Kim and Sarah are playing on the swings. Ann and Julie are playing with a drum.

A.2. Classmates condition

- Kim and Sarah are preschoolers.
- They spend most of their time in the same classroom. Look, Kim and Sarah are both sitting down for naptime.
- Ann and Julie are preschoolers.
- They spend most of their time in the same classroom. Look, Ann and Julie are both eating sandwiches.
- Look it's play time! Kim is playing on the swings. Ann is playing with a ball. Sarah is looking at the flowers. Julie is playing with a drun.

A.3. Social conflict

- Look, Julie is playing with a toy doggie.
- Oh my! Kim has pushed Julie! And Julie has dropped her toy doggie!

- Look, Kim took the toy doggie and is running away!
- Now Kim is playing with the toy doggie.
- Look, Julie has run over. Now Julie and Kim are fighting over the toy doggie.

A.4. Dizziness control

- Look, Sarah and Ann are spinning on the merry go round very quickly. Around and around and around!

References

Baron, A. S., Dunham, Y., Banaji, M. R., & Carey, S. (2007). Constraints on social-category based inferences. *Paper presented at the Biennial meeting of the society for research in child development*, Boston, MA.

Bennett, M., Yuill, N., Banerjee, R., & Thomson, S. (1998). Children's understanding of extended identity. *Developmental Psychology, 34*, 322–331.

Berndt, T. J., & Perry, T. B. (1986). Children's perceptions of friendships as supportive relationships. *Developmental Psychology, 22*, 640–648.

Costin, S. E., & Jones, D. C. (1992). Friendship as a facilitator of emotional responsiveness and prosocial interventions among young children. *Developmental Psychology, 28*, 941–947.

DeScioli, P., & Kurzban, R. (2009). Mysteries of morality. *Cognition, 112*, 281–299.

Grammer, K. (1992). Intervention in conflicts among children: Contexts and consequences. In A. H. Harcourt & F. B. M. de Waal (Eds.), *Coalitions and alliances in humans and other animals* (pp. 259–283). New York: Oxford University Press.

Harcourt, A. H. (1988). Alliances in contests and social intelligence. In R. W. Byrne & A. Whiten (Eds.), *Machiavellian Intelligence* (pp. 132–152). New York: Clarendon Press.

Harcourt, A. H., & deWall, F. B. M. (Eds.). (1992). *Coalitions and alliances in humans and other animals*. New York: Oxford University Press.

Lickel, B., Miller, N., Stenstrom, D. M., Denson, T. F., & Schmader, T. (2006). Vicarious retribution: The role of collective blame in intergroup aggression. *Personality and Social Psychology Review, 10*, 372–390.

Newcomb, A. F., & Bagwell, C. L. (1995). Children's friendship relations: A meta-analytic review. *Psychological Bulletin, 117*, 306–347.

Strayer, F. F., & Noel, J. M. (1986). The prosocial and antisocial functions of preschool aggression: An ethological study of triadic conflict among young children. In C. Zahn-Waxler, E. M. Cummings, & R. Iannotti (Eds.), *Altruism and aggression: Biological and social origins* (pp. 107–131). New York: Cambridge University Press.

Wainryb, C., Brehl, B. A., & Matwin, S. (2005). Being hurt and hurting others: Children's narrative accounts and moral judgments of their own interpersonal conflicts. *Monographs of the Society for Research in Child Development, 70*(3). i-122.