

# Thesis

## IS WHAT THEY SAY REALLY WHAT THEY DO?

*The correspondence between recalled social information processing and actual behaviour of aggressive and nonaggressive boys and the role of emotion regulation*

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### **Abstract**

*Reactive aggression is often linked to social information processing and more specific to the attribution of a hostile intent. In the present study we aimed to examine the correspondence between attribution of intent during a play session and recalled attribution of intent as measured with questionnaires in both typically developing children and aggressive children from 6 to 8 years of age. A second aim of this study was to examine if the predicted difference in levels of reactive aggression were mediated by attribution of intent. Methods: Typically developing children and aggressive children played a domino game in pairs. They had to respond to social information processing questionnaires after the game and two months prior to the game. Teachers filled out a questionnaire to establish teacher-rated reactive aggression scores. The results reveal that questionnaires designed to measure hostile intent are uncorrelated to hostile intent in behaviour. Second, it was found that the teacher-rated aggression score of the aggressive boys was significantly higher than that of the typically developing boys. However, there appeared to be no difference in reactive aggression levels during the game between typically developing boys and aggressive boys. There appeared to be no significant group difference on the hostile attribution scores measured during the game as well as measured with the questionnaires. We find that hostile intent measured with vignettes directly after the game predicted some of the aggression scores during the game. Reactive aggression during the game was highest among the boys who moderately attributed hostile intent. In conclusion we can state that what children respond to social information processing questionnaires doesn't represent the boy's actual behaviour. Aggressive boys and typically developing boys appeared equally aggressive during the game and attributed equal amounts of hostile intent. Future research should try to unravel the differences between these two groups by testing them in a more ambiguous situation.*

Keywords: reactive aggression, social information processing, hostile attribution bias, emotion, boys

## **Introduction**

Aggressive behaviours and co-morbid externalizing problems (i.e., non-compliance and hyperactivity) during childhood have been found to predict adjustment problems such as peer rejection, delinquency, substance abuse, school drop-out, unemployment and depression (for review see Vitaro, Brendgen & Barker, 2006). In addition, there is a huge amount of empirical evidence showing that aggressive behaviours are relatively stable during the course of development (Huesmann, Eron, Lefkowitz, & Walder, 1984; Olweus, 1979; in Vitaro, Brendgen & Barker, 2006). It is therefore important to understand the mechanisms underlying aggression.

Important models in understanding the cognitive processes underlying aggression (Dodge & Coie, 1987; Crick and Dodge, 1996) are the social information processing model (SIP-model) of Dodge (1986) and the reformulation of this model by Crick and Dodge (1994). The SIP model proposes that to react appropriately to social situations, social information has to be processed in six cognitive steps from perception of the stimulus to the enactment of behaviour: (1) the social information has to be encoded accurately; (2) the encoded information has to be interpreted correctly; (3) an interaction goal needs to be specified; (4) response alternatives have to be generated; (5) the response alternatives have to be evaluated; and (6) the selected response has to be enacted. The model implies that normal processing leads to adaptive social behaviour, whereas biased, inaccurate or ineffective processing leads to inappropriate behaviour such as aggression (Crick & Dodge, 1994).

According to Dodge and his colleagues, deficits in any of the social information processing steps can result in problem behaviours (Milich and Dodge, 1984). Indeed, numerous studies have found that aggression is related with deficiencies on all aspects of social information processing i.e. atypical encoding (Dodge, Bates, & Pettit, 1990), interpretation of situations as being hostile (Burgess et al., 2006; Crick and Dodge, 1996; Orobio de Castro et al., 2002), atypical goals (Slaby & Guerra, 1988), less diverse or more aggressive response generation (Asarnow & Callan, 1985), and positive evaluation of aggression (Dodge & Schwartz, 1997). However, these relations do not account for large portions of variance in aggressive behaviour. An aspect that could account for the small correlations found is the fact that these studies lacked a distinction between different forms of aggression that was displayed, i.e. reactive and proactive aggression (Dodge & Coie 1987; Dodge, 1991; Kempes et al., 2005).

Proactive aggression has been linked to the principles of social learning (Polman et al., 2007; Kempes et al., 2005) and is considered to be acquired instrumental behaviour that is controlled by its contingencies (Polman et al., 2007). Theoretical explanations for reactive aggression are derived from the frustration-aggression model (Berkowitz, 1993, in: Crick & Dodge, 1996; Kempes et al., 2005) and this type of aggression is considered as the consequence of frustration. If goals are blocked as a result of internal or external factors, hostility and anger may be triggered.

Reactive and proactive aggression were found to be related to different stages of the social information processing model (Dodge & Coie, 1987). In the current research the focus will lie on reactive aggression. This type of aggression has been linked to the first two steps of the SIP-model, i.e. encoding and interpretation. Particularly the way (ambiguous) social information is interpreted is found to be an important factor underlying reactive aggression. Aggressive children are more likely than average children to attribute hostile intent to a peer after an ambiguous provocation by the peer (Katsurada & Sugawara, 1998; Waldman, 1996; Orobio de Castro et al., 2002; Crick & Dodge, 1996; Burgess et al., 2006; Guerra & Slaby, 1989; Orobio de Castro, Merk, Koops, Veerman & Bosch, 2005; Lansford et al., 2006).

The relation between social information processing and reactive aggression is still low. An aspect that could account for this is the link between recalled social information processing and actual behaviour. The individual steps in the SIP model are described purely as cognitive processes and emotions and social information processing have rarely been studied together (Orobio de Castro et al., 2005). In many studies, hypothetical questionnaires are filled out when children are out of 'the heat of the moment'. So, in a way, we measure the cognitive abilities of the child to take all the steps of the SIP-model without considering emotional processes that would take place. Nevertheless emotion processes form an integral part of the SIP-model (Crick & Dodge, 1994). The role of emotions is sometimes described as "...gasoline, which activates the motor of an automobile but, does not modify its structure" (Piaget, 1981, p.5, in Lemerise & Arsenio, 2000). According to Lemerise and Arsenio (2000) emotions can be seen as an intrapsychological function of organizing and motivating behaviour and cognition to facilitate adaptive goal-directed behaviour. Emotions that are experienced prior to and during decision operations potentially have a direct or indirect effect on individual behavioural judgments and patterns of decision-making and behaviour (Fontaine, 2008). In fact, some authors propose that people who are emotionally aroused, only 'take' the first two steps of the SIP-model. The information is encoded and interpreted and may trigger emotional action tendencies, which trigger emotion-specific interaction goals, response generation, evaluation, and enactment without cognitively processing these steps (Orobio de Castro et al., 2005). Some evidence for this theory comes from a study performed by Orobio de Castro, Slot, Bosch, Koops and Veerman (2003). They found that highly aggressive boys did indeed attribute more hostile intent in a negative affective state than in a neutral state, whereas moderately and nonaggressive boys did not. These findings show that emotions had a significant effect on social information processing and these findings stress the importance of emotion in social information processing.

In the present study we will first examine the correspondence between attribution of intent during a play session and recalled attribution of intent in both normal children and aggressive children. The children play a series of games in pairs in which aggressive behaviour was experimentally. Attribution of intent was measured in three different ways: First, the hostile attribution bias is

measured during the game. It is represented by the following behaviour: one participant blaming the other for the fact that the domino pieces fall over. Second, directly after the end of the game SIP questionnaires are filled out to measure the experienced attribution of intent during the game. And third, a couple of months prior to the play session children were presented with a computerized hypothetical SIP task to measure the attribution of intent in a neutral state.

We first hypothesize (see figure 1) that the correspondence between attribution of intent during the game and the hostile attributions right after the game is higher than (2) the correspondence between attribution of intent during the game and attribution of intent as measured using computerised vignettes. This is because emotions play a major role during the play session. During the questions right after the game those emotions will be partly present, while the computerized vignettes involve less emotions. We will examine if the correspondence between actual behaviour and recalled social information processing is the same for children with disrupted behaviour problems and for typically developing boys.

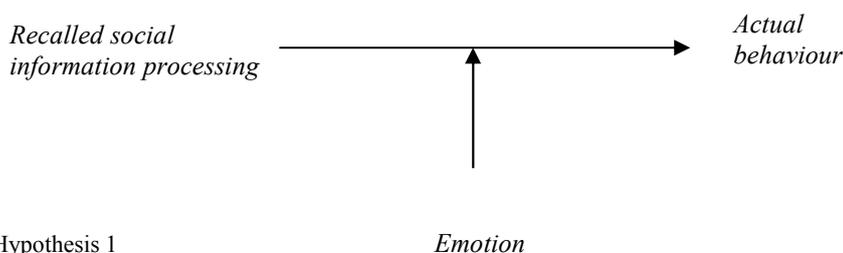


Figure 1. Hypothesis 1

A second aim of this study is to examine the relation between attribution of intent and aggression in aggressive and typically developing boys. We hypothesize (see figure 2) that the aggressive boys will have higher reactive aggression levels than the typically developing boys. In addition, we predict that the difference in reactive aggression levels between disruptive behaviour boys and the typically developing will be mediated by social information processing.

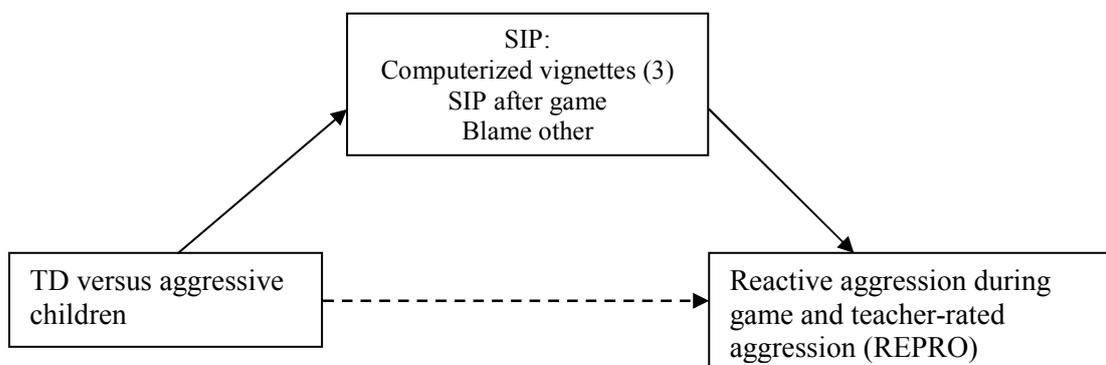


Figure 2. Hypothesis 2

## Methods

### *Participants*

The participants were Caucasian boys ( $n = 69$ ) aged between 6 and 8 years, subdivided in aggressive boys ( $n = 33$ ) and typically developing (normal control) boys ( $n = 36$ ). Children were excluded from the research if their IQ-score was under 80 and if they met the criteria for pervasive developmental disorder. Fourteen schools in large metropolitan and small countryside villages spread throughout the Netherlands participated in the study. The typically developing boys attended grade three to five of four Dutch regular elementary schools. The aggressive group was solicited from ten Dutch special education schools for children with severely disruptive behavioural disorders. In the Netherlands, children must demonstrate severe behaviour problems and significantly impaired daily functioning in multiple settings, to qualify for special education. We measured aggressive behaviour using the Teacher Rating Form, a widely used checklist for child behaviour problems (Achenbach, 1991). The highly aggressive boys showed significantly higher levels of aggressive behaviour ( $M = 67.52$ ,  $SD = 8.81$ ) compared to the typically developing boys ( $M = 53.55$ ,  $SD = 5.79$ ;  $F(2,67) = 61.1$ ,  $p < .001$ ). There was no significant intelligence difference between the typically developing boys ( $M = 104$ ,  $SD = 11.3$ ) and the aggressive boys ( $M = 99$ ,  $SD = 11.6$ ;  $F(2, 69) = 3.4$ ,  $p = .07$ ).

Based on sociograms (Maassen et al., 2005) participants were subdivided into couples. Boys who mutually judged each other as being friendly (a score of 3, 4 or 5 on a 5-point Likert scale) were coupled as a pair. In case a boy couldn't be matched to a classmate who met the criteria for our research, they were coupled to a playmate. The criteria for the playmate were identical to that of the participants except that the playmate did not meet the criteria for a disrupted behaviour disorder. The data of the playmates ( $n = 18$ ) is excluded in the data used in our analysis.

### *Procedures for the play sessions*

The play session took place at the children's school in a room that was temporarily adapted for the purpose of this study. Two video cameras were positioned on either side of a table in order to videotape the play session. These cameras were disguised as aliens to distract the children's attention from the fact that they were video taped.

Participants were taken from the classroom by a research assistant and brought to a room where the play session would take place. Before starting the games, the children picked out a reward. To motivate the children, the researchers promised them this present if they gathered enough points over the games. The game session was imbedded in a space theme. One boy was called the 'red astronaut' and the other boy the 'blue astronaut', they wore overalls with a picture of an astronaut in that colour so that they could be recognized during the scoring afterwards.

The children played six games in succession. The first game was 'the planet game'. In this game the children were asked to cooperate in populating a planet on drawn land maps; they had to

allocate a large number of animal figures on land or sea, depending on the type of animal. After this control game, they played two competitive games (called ‘*building a rocket*’ and ‘*Lego*’). In ‘building a tower’ they had to build a tower on a grey platform with wooden blocks. In ‘Lego’ the children had to replicate a spaceship of Lego stones from a sample. After these two competitive games there was a break in which the children got something to drink and watch the movie ‘Madagascar’. After this 20 minute break, the children were asked to play a second version of ‘*the planet game*’ and two other competitive games called ‘*B-daman*’ and ‘*Domino*’). In the B-daman game the children had to fire balls from blasters to score as many points possible. The children were asked to keep track of their points.

<b>Game</b>	<b>Time</b>	<b>Sequence 1</b>	<b>Sequence 2</b>
Planet game	5 minutes	Game 1	Game 1
Building a rocket	10 minutes	Game 2	Game 5
Lego	10 minutes	Game 3	Game 6
Planet game	5 minutes	Game 4	Game 4
B-daman	10 minutes	Game 5	Game 2
Domino	10 minutes	Game 6	Game 3

*Table 1.* The sequence and duration of the six games in the two different versions

In this study we focus on the ‘*domino*’ game, which most successfully provokes reactive aggression. In this game each child had to set up his own course with upright domino stones following a route that was drawn on a table. The two routes started at the same point on the table, leading into opposite directions. When the domino stones of one child fell over, this would automatically have a ‘domino-effect’ on the domino stones of the other child. Furthermore the route of the blue astronaut was manipulated with drops of glue, so that the domino stones would fall easy. This causes frustration, which possibly leads to aggression.

Before the start of each game research assistants gave a standardized instruction about the game, after which they left the observation room. Three researchers observed the interaction from a video screen connected to one of the cameras. If the interactions would become too threatening to one of the boys, the researchers would intervene and the play session stopped (n= 7).

### *Scoring of behaviour*

The videotapes of the sessions were analysed afterwards by trained observers using an ethogram. Different groups of behaviour were scored. Aggressive behaviour, antisocial behaviour, affiliative

behaviour, stress behaviour and other behaviour. In the recent research the focus will be on the aggressive behaviour group. Behaviour in this category was, for example, physical aggression, verbal abuse, cheat, blaming other and symbolic redirection. (For an extensive description of all aggressive acts scored, see appendix 1.) Right after the last aggressive behaviour in a conflict, observers scored whether the aggressive behaviour was proactive, reactive or unclear. The first aggressive behaviour from a subject in a conflict determined the type of aggression in a conflict. Proactive aggression was scored when the aggression was instrumental and displayed to acquire a certain goal. Reactive aggression was scored when the aggression was a direct reaction on a provocation or manipulation with a high level of impulsivity. When it was unclear whether the aggression was proactive or reactive the behaviour was scored as 'unclear aggression'. In the recent study the data of the reactive aggression scores is used. The three scales were totalled to establish the total aggression score of the children. The behaviour of both children was scored simultaneously and the exact time of each act was recorded with an accuracy of 0.1 sec. Inter-observer reliability of the scoring of the behavioural elements was assessed between three trained observers and was high ( $\kappa = .70$ ).

#### *SIP questionnaires*

After each game the research assistants re-entered the room and separated the boys present the children with questionnaires form which we derived how they interpreted specific situations during the game. The boys had to answer questions about the game, e.g. whether they liked playing and about their emotions during the game. This also contained the following SIP-questions to measure hostile attribution bias: *'I saw X made all the pieces fall over, can you remember this?'*, *'Why do you think he did this?'*, *'Did he do it on purpose?'*, *'Was he being mean to you?'*, *'How mean (5 point Likert-scale)?'* and *'What was your reaction?'* We referred to the domino pieces falling over, because it is an ambiguous situation that almost always happens during the game session. In the present research we will focus on the answers to the questions *'Did he do it on purpose?'* and *'Was he being mean to you?'*. If boys answered 'yes' to both questions it was scored as 2 (high hostile intent), if boys answered yes to one of these questions it was scored as 1 (moderate hostile intent), and if the boys answered no to both questions it was scored as 0 (no hostile intent).

#### *Hypothetical SIP vignettes*

A couple of months prior to the play session the boys were presented with a computer task designed to measure online social information processing. Preceding the actual computer task the participants received a short explanation about the task and the computer program. After the introduction the participants are presented with a trial session to determine if they understood the task. And following the trial, the actual task begins.

The participants are presented with six 'photo-stories' while they are simultaneously given instructions through headphones. Each story consists of four pictures by which the hypothetical story is told step by step. With every picture the participant receives a bit of information about how the story continues. The stories describe a situation in which a peer with ambiguous intentions hinders the participant. These ambiguous intentions become non-ambiguous after the fourth picture (which shows a peer with either a happy face or an unhappy face). By offering the pictures one at a time, we are able to see how the SIP process changes and develops over time. Additionally, it gives information about both the interpretation of ambiguous and non-ambiguous social situation and the processing speed.

After each story the participants are presented with questions regarding their own mood and the mood of the peer in the described situation. The questions are answered by using a thermometer (6 point Likert-scale). For both the aggressive group as the typically developing group, the sequence of the stories is determined by a Latin Square. It is taken into account that the sequences occur just as frequently for both groups. The sequence of the story's ending, i.e. a negative or positive, was established in advance. For every child the first, the third and the fourth story had a bad ending and the second, the fifth and the sixth story had a positive ending.

In this study we will use the participants response on all six stories after seeing the third picture. This gives information about the processing of unambiguous information. We represented them with the following questions: "Did the other boy do this on purpose?" and "How mean is it what the other did?". The boys' answered on a six point Likert-scale. The Cronbach's Alpha between the answers on the first ( $\alpha = .70$ ) and the second question was high and ( $\alpha = .83$ ), as well as the Cronbach's Alpha between all the answers ( $\alpha .85$ ). Because of this high alpha, a mean score was used in the analyses.

### *Intelligence Measures*

In order to assess the Intelligence Quotient (IQ), the typically developing children were required to complete two subtests of the Wechsler Intelligence Scale for Children-Revised (WISC-R; Vandersteene, van Haasen, de Bruyn et al. 1986), namely the Vocabulary and Block Design. The subtests have a correlation of .90 with the full-scale intelligence quotient (IQ) (Sattler, 1992). Full IQ data for children from special schools, as measured by the WISC-R, were collected as part of the psychological assessment done by the special school psychologist.

### *Teacher Rating Form (TRF)*

The participant's teachers completed the Dutch version of the TRF (Verhulst et al., 1997; Achenbach, 1991), a widely used checklist of child behaviour problems. For each of the 113 behaviour items in this questionnaire, teachers responded 0 if the problem statement was not true for the child, 1 if

somewhat true and 2 if very or often true. The questionnaire consists of eight subscales representing different forms of problem behaviours e.g. aggressive behaviour, in children, an internalizing and externalizing distinction and a total problem score. For the present study we used the participants scores on aggressive behaviour.

#### *Aggression measure - REPRO*

The REPRO questionnaire is developed by Dodge and Coie (1987) to measure aggression. The scale is translated into Dutch by Orobio De Castro and college's (2000). The scale exists of three items measure reactive aggression (“reacts angry and resentful when teased”, “blames other children when involved in a dispute” and “reacts angry if accidents happen”) and three items that measure proactive aggression (“encourages other children to bully”, “uses physical violence to get his way” and “bullies and threatens to get his way”). Parents and teachers were asked to respond to the questionnaire on a five point Likert scale. For each of the 6 questions, they responded 1 if the problem statement was not true for the child and 5 if the problem statement is very often true.

The intern consistence of the proactive aggression scale is .70 (Cronbach's Alpha) for parents and .85 for teachers. The Cronbach's Alpha of the reactive aggression scale is .73 for parents and .87 for teachers. In previous international studies both scales had Cronbach's Alpha between .87 and .91 (Crick & Dodge, 1996; Dodge & Coie, 1987; Poulin & Boivin, 2000). The subscales are correlated with  $r = .70$ ,  $p < .05$  for the teachers sample and  $r = .66$ ,  $p < .05$  for the parents sample. These intercorrelations are lower than was shown in previous research ( $r = .76$ , Dodge & Coie, 1987;  $r = .83$ , Price & Dodge, 1989;  $r = .90/.82$ , Poulin & Boivin, 2000). In the present research only the reactive aggression scale that was filled out by the teachers is used.

## Results

### *Blaming other and the SIP-questionnaires*

Both typically developing boys and aggressive boys did not show significant correlations between blaming other during the game and the response to the SIP questions right after the game (see table 3 and 4). There appeared to be a negative significant correlation between blaming other during the game and the computerized vignettes for the group as a whole ( $r = -.278, p < .05$ ) and for the typically developing boys ( $r = -.331, p < .05$ ). For the group as a whole we found a small but significant correlation between the answers to the SIP questions after the game and the computerized SIP vignettes. This correlation is not significant for the two separate groups.

	Blaming other	SIP after game
SIP after game	.100	-
SIP computer task	-.278*	.221*

Table 2. *Correlations between blaming other and the SIP questionnaires for the group as a whole*

\* = significant ( $p < 0.05$ )

	Blaming other	SIP after game
SIP after game	.130	-
SIP computer task	-.331*	.198

Table 3. *Correlations between blaming other and the SIP questionnaires for the typically developing boys*

\* = significant ( $p < 0.05$ )

	Blaming other	SIP after game
SIP after game	.018	-
SIP computer task	-.190	.262

Table 4. *Correlations between blaming other and the SIP questionnaires for aggressive developing boys*

### *Aggressive boys vs. typically developing boys and reactive aggression*

A one-way ANOVA was conducted to test for group differences on the reactive aggression scores (see table 5). Aggressive boys showed significantly more teacher-rated reactive aggression than did the typically developing boys as measured with the REPRO ( $M_{td} = 2.15, SD_{td} = .90, M_{ab} = 3.80, SD_{ab} =$

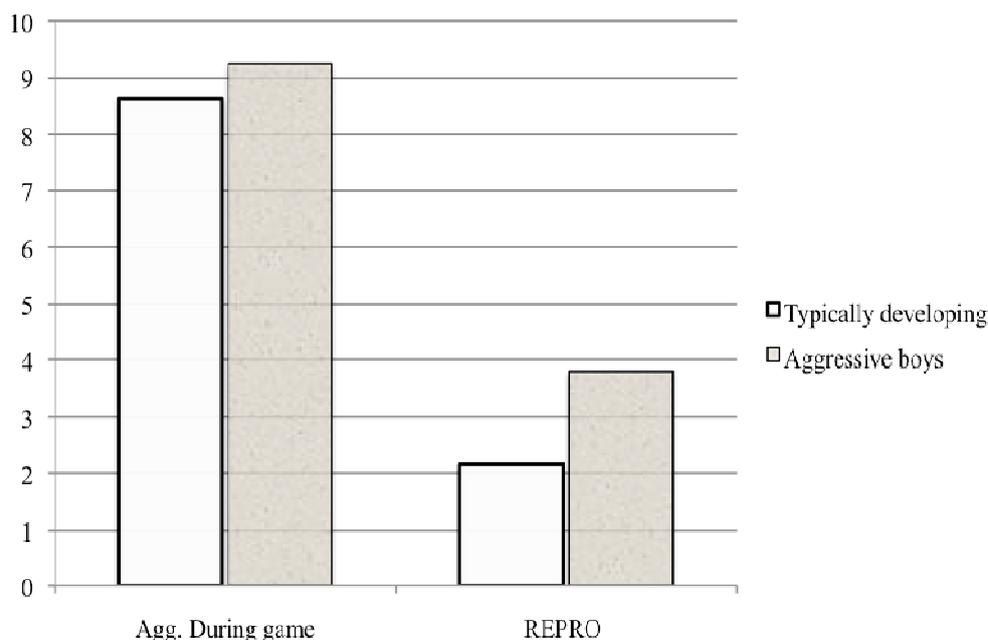
.98,  $F(2,69) = 54.7, p < .001$ ). They do not show significantly more reactive aggression during the domino game ( $F(2,64) = 0.22, p = .64$ ).

Between group differences	Typically developing boys (TD)		Aggressive boys (AB)		Sig.
	Mean	SD	Mean	SD	
Parent rated aggression (REPRO)	2.15**	.896	3.80**	.982	.000
Aggression during game	8.62	5.862	9.25	5.086	.642

Table 5. Mean aggression scores of typically and aggressive developing boys on the REPRO and during game session

\*\* = Significant ( $p < .001$ )

Figure 3. Mean aggression scores during game and mean teacher-rated aggression scores for the typically developing boys and the aggressive boys.



#### Aggressive vs. typically developing boys and SIP

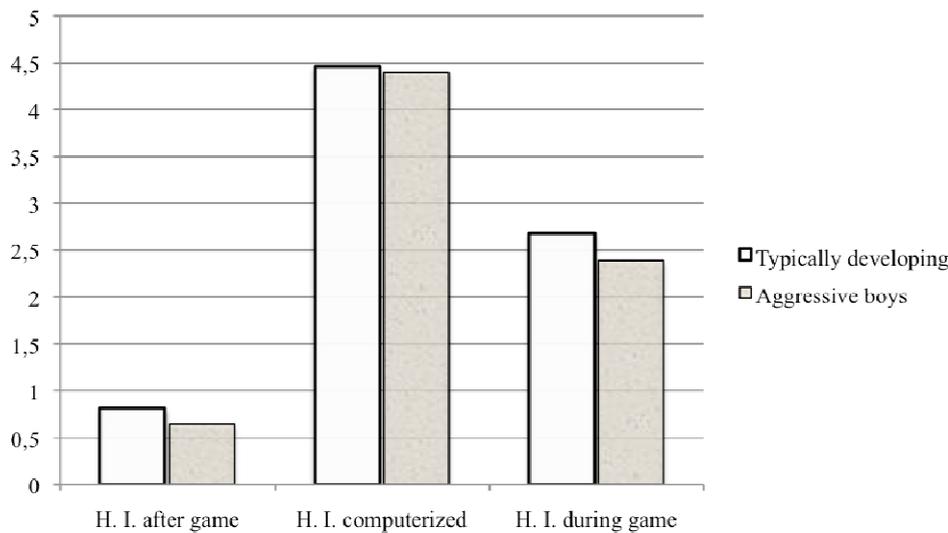
A one-way ANOVA was conducted to test for group differences on scores of attribution of intent. The aggressive boys did not show significant more attribution bias during the game (blaming other) than the typically developing boys  $F(2,65) = .26, p = .61$ .

Between group differences	TD		AB		Sig.
	Mean	SD	Mean	SD	
Hostile intent measured after game	.81	.92	.64	.74	.406
Host. int. computerized vignettes	4.46	3.11	4.40	2.93	.936
Blaming other during game	2.68	2.56	2.39	1.94	.612

Table 6. Mean scores and standard deviations of typically and aggressive developing boys on blaming other during the game, the SIP questionnaires right after the game and the computerized SIP vignettes.

There was no significant difference between the two groups in the attribution of intent as measured with the SIP questionnaires, right after the game  $F(2,67) = .699, p = .41$ ) or the computerized vignettes  $F(2,65) = .006, p = .94$ ).

Figure 4. Mean hostile intent (H. I.) scores measured during the game, with computerised vignettes and after the game for typically developing boys and aggressive boys



#### *Hostile attribution bias measured after the game and reactive aggression*

To find out if reactive aggression was influenced by the hostile attribution bias measured right after the game, a one-way ANOVA was conducted (see figure 3). The boys who didn't attribute hostile intent as measured with the SIP questionnaires, appeared to be less reactive aggressive during the game than the boys who moderately attributed hostile intent ( $F(3,60) = 3.59, p < .05$ ). Hostile intent appeared not to predict the aggression score as measured with the REPRO ( $F(3,65) = .244, p = .80$ ).

Between group differences	No hostile intent		Moderate hos. int.		High hostile intent		Sig.
	Mean	SD	Mean	SD	Mean	SD	
Teacher rated reactive agg.	2.97	1.39	3.04	.67	2.76	1.40	.80
Reactive agg. during game	7.87*	4.09	12.2*	6.6	9.24	5.45	.034

Table 7. Mean scores and standard deviations of boys with no, moderate or high hostile intent on reactive aggression during the game and teacher rated reactive aggression for the group as a whole

\* = significant ( $p < 0.05$ )

Hostile intent appeared not to predict the aggression score of the typically developing boys (see table 8) as measured with the REPRO ( $F(3,33) = 1.42, p = .256$ ) and as measured during the game ( $F(3,29) = .86, p = .43$ ).

Between group differences	No hostile intent		Moderate hos. int.		High hostile intent		Sig.
	Mean	SD	Mean	SD	Mean	SD	
Teacher rated reactive agg.	2.05	.89	2.80	.77	2.08	.98	.26
Reactive agg. during game	7.80	4.62	11.40	7.96	9.75	6.05	.43

Table 8. Mean scores and standard deviations of boys with no, moderate or high hostile intent on reactive aggression during the game and teacher rated reactive aggression for the typically developing boys

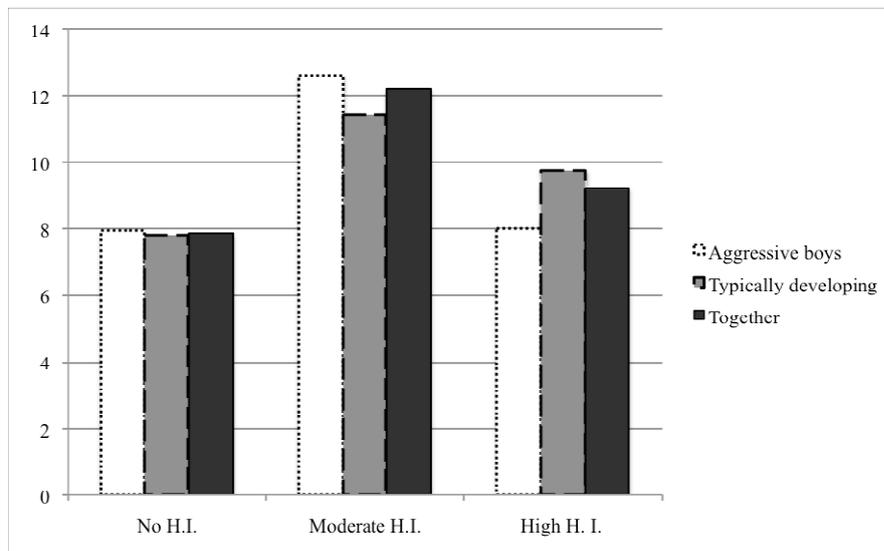
For the aggressive developing boys, some differences appeared to be significant. The aggressive boys who didn't attribute hostile intent as measured with the SIP questionnaires, appeared to be less reactive aggressive during the game than the boys who moderately attributed hostile intent ( $F(3,28) = 3.33, p = .05$ ). It was also found that aggressive boys with moderate attribution biases were less aggressive as measured with the REPRO than boys who highly attributed hostile intent ( $F(3,29) = 3.86, p < .05$ ).

Between group differences	No hostile intent		Moderate hos. int.		High hostile intent		Sig.
	Mean	SD	Mean	SD	Mean	SD	
Teacher rated reactive agg.	4.00	1.09	3.17*	.61	4.40*	.68	.033
Reactive agg. during game	7.94*	3.68	12.60*	6.24	8.00	3.94	.05

Table 8. Mean scores and standard deviations of boys with no, moderate or high hostile intent on reactive aggression during the game and teacher rated reactive aggression for the aggressive boys

\* = significant ( $p < 0.05$ )

Figure 5. Mean reactive aggression scores during the game of boys with no, moderate or high hostile intent (H. I.) scores for typically developing boys, aggressive boys and for the group as a whole



#### *Hostile attribution bias measured with computerized vignettes and reactive aggression*

To find out if the computerized SIP vignettes predicted aggression, multiple linear regression analyses were conducted. First the whole group was analysed. Results of this analyses indicated that the hostile attribution bias as measured with the computerized SIP questions didn't predict the reactive aggression score during the game ( $F(1,60) = 0.01, p = .93$ ). Neither did it predict the teacher-rated reactive aggression score as measured with the REPRO ( $F(1,65) = 1.57, p = .22$ ).

Second, the aggressive boys and the typically developing boys were analysed as separate groups. Results of these analyses indicated that the hostile attribution bias as measured with the computerised SIP vignettes didn't predict teacher-rated reactive aggression for the typically developing boys ( $F(1,36) = .013, p = .91$ ). There appeared to be a significant negative relationship between the hostile intent as measured with the computerized vignettes and the teacher-rated reactive aggression score ( $F(1,27) = 6.07, p < .05$ ) in aggressive boys. The strength of this relationship expressed as a standardised coefficient is  $-0.43$  ( $p < .05$ ). From the variance of the reactive aggression rated by the teacher 18% can be explained by hostile attribution bias as measured with the computerized vignettes.

	<b>Beta</b>	<b>R<sup>2</sup></b>	<b>Sig.</b>
Typically developing	-.019	.00	.91
Aggressive boys	-.428	.18	.02*
Group as a whole	-.154	.02	.22

Table 9. *Correlations coefficients and proportions explained variance of the teacher-rated aggression score, by hostile attribution bias measured with the computerised vignettes for the aggressive boys, the typically developing boys and the group as a whole*

\* = significant ( $p < .05$ )

Hostile attribution bias measured with the computerised vignettes appeared not to predict aggression during the game for the typically developing boys ( $F(1,32) = 2.09, p = .158$ ). Hostile intent as measured with the computerized vignettes significantly predicted reactive aggression during the game in a positive direction ( $F(1,26) = 4.38, p = .05$ ) in aggressive boys. The strength of this relationship expressed as a standardised coefficient is .38 ( $p = .05$ ). From the variance of the reactive aggression rated by the teacher 14% can be explained by hostile attribution bias as measured with the computerized vignettes.

	<b>Beta</b>	<b>R<sup>2</sup></b>	<b>Sig.</b>
Typically developing	-.247	.06	.16
Aggressive boys	.380	.14	.05*
Group as a whole	.012	.00	.93

Table 10. *Correlations coefficients and proportions explained variance of the reactive aggression during the game, by hostile attribution bias measured with the computerised vignettes for the aggressive boys, the typically developing boys and the group as a whole*

\* = significant ( $p < .05$ )

#### *Hostile attribution bias during the game and teacher-rated reactive aggression*

To find out if the hostile attribution bias during the game predicted teacher-rated reactive aggression, multiple linear regression analyses were conducted (see table 11). First the whole group was analysed. Results of this analyses indicated that the hostile attribution bias measured during the game didn't predict the teacher-rated reactive aggression score ( $F(1,64) = 0.70, p = .41$ ).

Second, the aggressive boys and the typically developing boys were analysed as separate groups. Results of these analyses indicated that the hostile attribution bias measured during the game didn't

predict teacher-rated reactive aggression for the typically developing boys ( $F(1,32) = .628, p = .43$ ). Neither did it predict the teacher rated reactive aggression score for the aggressive boys ( $F(1, 30) = .074, p = .79$ )

	<b>Beta</b>	<b>R<sup>2</sup></b>	<b>Sig.</b>
Typically developing	-.139	.019	.43
Aggressive boys	-.049	.002	.79
Group as a whole	-.104	.011	.41

Table 11. *Correlations coefficients and proportions explained variance of the teacher-rated reactive aggression, by hostile attribution bias during the game for the aggressive boys, the typically developing boys and the group as a whole*

## Discussion

The first aim of this study was to establish the correspondence between hostile attributions during the game and hostile attributions as measured with questionnaires and computerized vignettes. We assumed that emotions during the game would influence the level of hostile intent. Our first hypothesis was that the correspondence between the recalled hostile intent after the game and hostile intent during the game is stronger than the correspondence between the hostile intent score during the game and the recalled hostile intent score measured with computerized vignettes.

We find that the amount of hostile intent that boy's display during the game is not correlated to the boys' hostile intent as measured with questionnaires after the game. A second surprising result is that the amount of hostile intent during the game is negatively correlated to the amount of recalled hostile intent measured with the computerized vignettes for the group as a whole and for the typically developing boys. The more hostile intent the boys show during the domino game, the less they display during the computer task and visa versa. There were no significant correlations found for the aggressive subgroup. So, to answer the question we started with: what they say is not what they do.

An explanation for these findings could be that the emotions during the game have impact on the behaviour of the boys in such a way, that their behaviour is unpredictably influenced. The SIP questionnaires only measure if boys are cognitively able to process social information. Out of the 'heat of the moment' the boys appear not to be able to predict their own actions. (Emotional) self-regulation might play a major role in the explanation of the difference we found. Children at the age of 6 to 8 years old are beginning to develop "the ability to monitor one's own conduct, constantly adjusting it as circumstances bring opportunities to violate inner standards" (Berk, 2003, pp 504). They tend to react more emotional and fast, instead of cognitive and slower. When boys get older, they gradually become more able to regulate behaviour during the course of action using more cognition. Future research

should therefore focus on older children to find out if hostile intent as measured with questionnaires is related to hostile intent in behaviour in this age group.

The second aim of this study was to examine the relation between attribution of intent and aggression in typically and aggressive developing boys. We hypothesized that the aggressive boys would have higher levels of teacher-rated reactive aggression and higher levels of reactive aggression during the game than the typically developing boys (A). We also expected the aggressive boys to have higher levels of hostile intent than the typically developing boys (B). We predicted that the difference in reactive aggression levels between aggressive boys and the typically developing boys was mediated by the attribution of hostile intent (C).

When we first look at the teacher-rated aggression scores, we found a significant group difference between aggressive boys and typically developing boys as shown in figure 6. As expected, aggressive boys had higher teacher-rated aggression scores than typically developing boys. Surprisingly, there was no significant group difference in the amount of reactive aggression during the domino game. Typically developing boys and aggressive boys had the same amount of (reactive) aggressive acts.

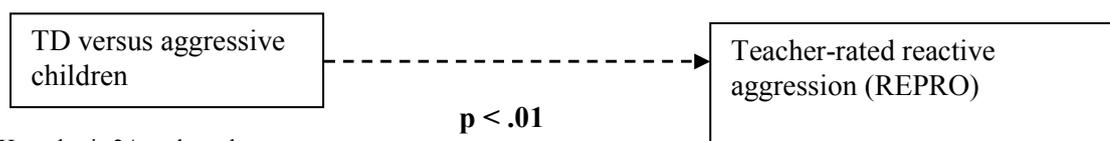


Figure 6. Hypothesis 2A and results

When we look at the between group results for hostile intent (see figure 7), the results are also not as we predicted. There was no significant group difference found on the hostile attribution scores. Aggressive boys made as much hostile attributions as normal developing boys during the game as well as measured by the (computerized) questionnaires.

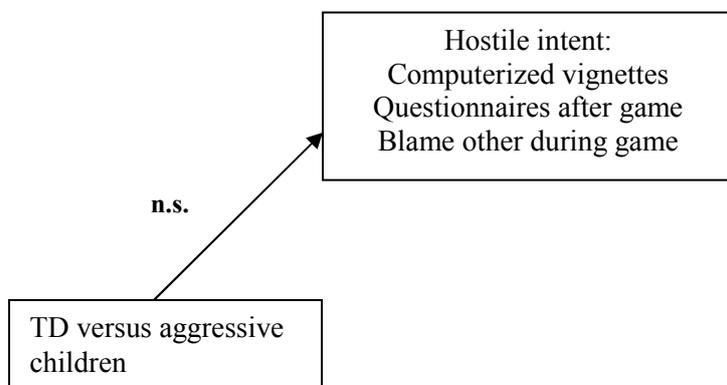


Figure 7. Hypothesis 2 B and results

Perhaps, the expected difference in the amount of reactive aggression between the two groups will be found when the length of the conflicts or the reconciliation behaviour is taken into consideration. Recent research has suggested that aggressive children have as much conflicts as typically developing children, but they are not able to recognize reconciliation behaviour (Kempes, Orobio de Castro & Sterck, in revision). They are unable to respond to this attempt to reconcile and therefore their conflict start earlier in the game and last longer. Kempes et al. (in revision) found that the length of the conflicts is related to the teacher-rated reactive aggression scores. Future research should focus on establishing the exact differences in aggressive behaviour between aggressive and typically developing boys. If it is not the amount of aggression, than what makes aggressive boys more aggressive?

Another explanation for the absence of a group difference might be that both typically developing boys and aggressive boys were frustrated by this provocative domino game. Therefore both groups react with a certain amount of reactive aggression. The difference between the two groups might become apparent during a more ambiguous situation in which aggressive boys might respond with earlier and stronger aggression. The same explanation might be accountable for the fact that there was no significant group difference found on the hostile attribution scores. The aggressive boys possibly make more hostile attribution errors in a more ambiguous situation than the typically developing boys. For that reason future research should focus on a more ambiguous situation leading to frustration. Typically developing children will be expected to make less hostile attributions in these situations than aggressive boys and therefore they will have lower reactive aggression scores.

Additionally, because the play sessions were terminated when aggression escalated to a point that was unacceptable, we might have reached a ceiling effect of aggression. The highest point of aggression during the play sessions might not have been the highest possible aggression score of the aggressive children. So even though we expected aggressive children to have more extreme levels of aggression, it was not ethical to examine this hypothesis.

When we look at the results of the last hypothesis (see figure 8), we find that hostile intent measured with vignettes directly after the game predicted some of the aggression scores during the game. However the results did not correspond with our expectations. The boys who didn't attribute hostile intent as measured with the SIP questionnaires, appeared to be less reactive aggressive during the game than the boys who moderately attributed hostile intent. Interestingly, boys who highly attributed hostile intent showed no more reactive aggression than boys who had no hostile attribution bias. The results for the aggressive children were similar and significant, as well as the results for the typically developing subgroup (although not significant). So, in contrast to what we expected, reactive aggression during the game was highest among the boys who moderately attributed hostile intent. The teacher-rated aggression was higher among the aggressive boys with a high hostile attribution bias as measured after the game, than among aggressive boys with moderate attribution biases (but not more aggressive than boys without the hostile intent as measured after the game).

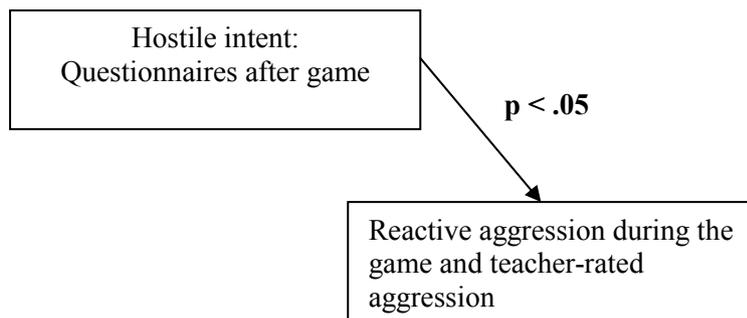
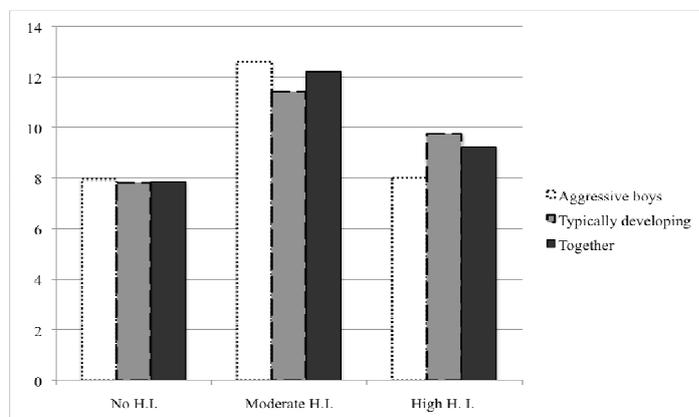


Figure 8. Hypothesis 2 C and results for the both typically developing boys and the aggressive boys

A remark has to be made on these results. The group of aggressive children that highly attributed hostile intent was small (N=5), which might explain why the difference is not found for this group of children. However as shown in figure 9, the result are stable across the groups and do suggest that the high hostile intent boys are not more aggressive than the moderately hostile intent boys. Perhaps, if the groups of moderate and high hostile intent are merged the results better reflect the reality.

Figure 9. Mean reactive aggression scores during the game of boys with no, moderate or high hostile intent (H. I.) scores for typically developing boys, aggressive boys and for the group as a whole



When focussing on the results of hostile attribution bias as measured by the computerized vignettes, some interesting results appear (see figure 10). The computerized vignettes explained 14% of the variance in reactive aggression during the game showed by the aggressive boys and 18% of the variance in the teacher-rated aggression score of the aggressive boys. The explained variance of the typically developing boys appeared insignificantly small. So, although hostile attribution bias did account for some of the variances in reactive aggression scores, the correlations found are small and

only significant for the aggressive children. Hostile intent during the game was, for both typically developing and aggressive children, unrelated to teacher-rated aggression.

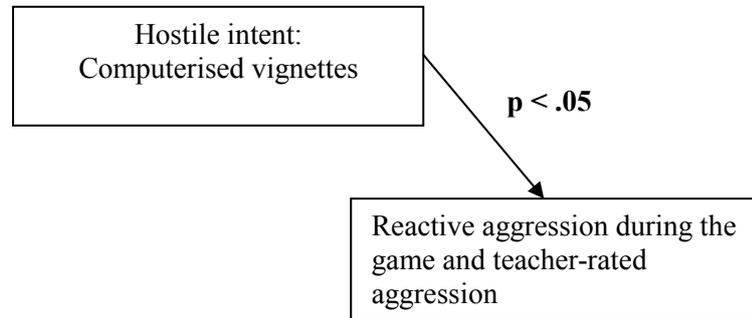


Figure 10. Hypothesis 2 C and results for the aggressive boys

These surprising findings could possibly be explained by the age of the boys. Recent research from Kean et al. (2005; in Lansford et al., 2006) established that patterns of SIP problems during elementary school did not predict externalizing behaviours in grade 11. However, patterns of SIP problems in grade 8 predicted two of the four measures of externalizing in grade 11. This is consistent with previous research showing that as children develop, social cognition becomes more strongly connected with actual behaviour (Lansford et al., 2006) and that beliefs about aggression begin to predict aggressive behaviour after the age of eight years (Huesmann & Guerra, 1997, in Lansford et al., 2006). So again, future research should focus on older children to really establish the impact of social information processing on behaviour.

The results might also have been influenced by some limitations of the current study. First, we measured hostile intent during the game by counting the amount of times the boys blamed the other for an ambiguous intent. The consequence of this method is that we could only measure the hostile intent when the boys verbalized it. It is likely that the boys have had unspoken attributions that influenced their behaviour and therefore e.g. their amount of reactive aggression. Second, analyses of the separate groups of typically developing and aggressive children gave a more accurate image of social information processing, but the created groups were perhaps too small. There was no power analysis conducted, but methodological power problems might explain why some differences remained insignificant. Third, social desirability may play a role in the boys' responds to the computerized vignettes and the questionnaires. The boys were aware of the answers that are most favourable and possibly even use this to determine what they would do. Additionally, the awareness of the present they would receive after the games might have influenced their behaviour during the game. Future research should include a measure for social desirability and perhaps rethink the timing of the gift offering.

Overall the results suggest that the answers to the SIP questionnaires do not predict behaviour. The questionnaires (after the game and the computerized vignettes) seem to measure the cognitive ability to process social information without the emotions that are part of actual (provocative) situations. Second (see figure 11) we can conclude that there was no behavioural difference in the frequency of aggressive acts between typically developing boys and aggressive boys, although the teacher-rated aggression score of the aggressive boys was higher. Also the aggressive boys didn't attribute more hostile intent. The amount of hostile attribution did account for some of the variances in reactive aggression scores but the correlations found are small and only significant for the aggressive children.

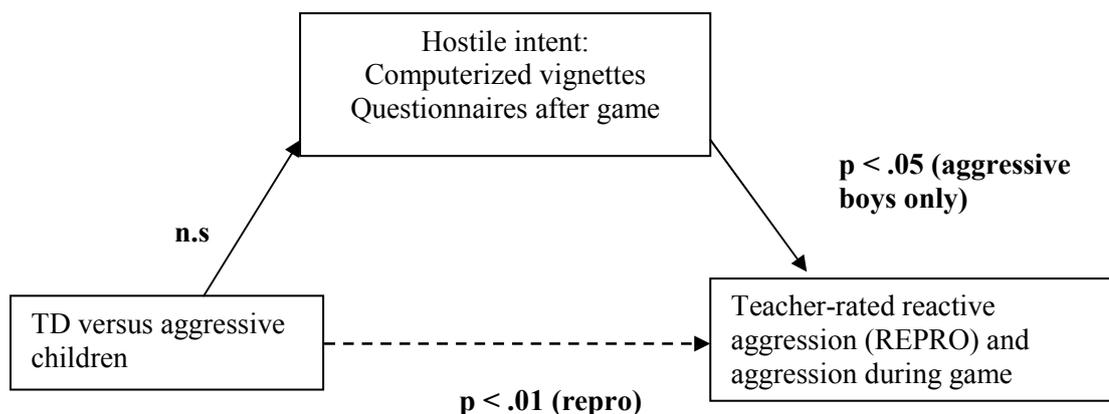


Figure 11. Hypothesis 2 and results

Future research should further investigate the above results. If children response to SIP questionnaires is indeed unrelated to actual behaviour, this will have an impact on treatment aspects of antisocial behaviour. For example, cognitive behavioural therapies are based on the adjustment of social information processing by offering social cognitive problems. Therapists try to alter the way children process social information by learning children e.g. different ways to solve the social dilemmas (response generation) or by helping them to select the right way to respond in different situations (response evaluation). If children are unable to generalize this knowledge to actual situations in which the child gets emotionally aroused, than perhaps adjusting aspects of these therapies can improve the effectiveness of treatment.

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## Appendix 1

### **Aggressive behaviour**

1. *Physical aggression* – Punching, kicking, biting, fighting, pushing, or throwing objects to the target child.
2. *Physical threats* – Physically threatening to hurt the other, for example by making a hitting motion to the other child.
3. *Verbal threats* – Verbally threatening to hurt the other, commanding the other accompanied by some threat ('Do this or I'll hit you!'), threatening to disturb the others' game ('I'm going to knock over your pieces'), or threatening to tell a game leader about the others' supposed cheating ('I'm going to tell them you are cheating').
4. *Derogatory Comment* – Stressing ones own superiority over the other ('I'm much better at this game than you are'), insulting the other in a personal, bullying way, for example making a remark about a child's obesity to an obese child.
5. *Verbal abuse* – Insulting the other, shouting at the other.
6. *Disturbing game of opponent* – Frustrating the other in achieving the goals of the game, i.e. deliberately knocking over the others domino pieces.
7. *Disturbing game in general* – Frustrating the game in general, also for oneself, usually out of frustration with the game situation, i.e. deliberately knocking over all the domino pieces, also ones own.
8. *Cheat* – Manipulating a game by deliberately violating the rules of the game.
9. *Encourage the other to cheat* – Verbally encouraging the other to violate the rules of the game.
10. *Take and grab* – Grabbing an object from the other without the others permission.
11. *Blaming other* – Blaming the other for an unwanted situation, in for example saying 'It's your fault the pieces fell over', saying 'hey thanks a lot' or saying the other child's name in a blaming way.
12. *Commanding* – Commanding the other to do something, suggesting something in a commanding way ('Don't let the pieces fall over' or 'Do this or that').
13. *Temper tantrum* – Jumping up and down in rage, screaming, lying on the floor kicking etc.
14. *Symbolic redirection* – The initiator and/or victim would direct their frustration at an object by hitting or kicking it.
15. *Displaying frustration towards other* – Directing the frustration towards the other, verbally or non-verbally.

**Appendix 2****SIP questionnaires after the game**

Participant: .....  
Date: .....

Playmate: .....  
Coach: .....

**B-Daman**

<i>Vragen</i>	<i>Antwoorden</i>	<i>Vragen</i>	<i>Schalen</i>
1) Hoe ging het?	.....		
2a) Vond je het leuk?	.....	2b) Hoe leuk?	_____
3a) Was je blij?	.....	3b) Hoe blij?	_____
4a) Was je boos?	.....	4b) Hoe boos?	_____
5a) Was je verdrietig?	.....	5b) Hoe verdrietig?	_____
6a) Vond je X aardig?	.....	6b) Hoe aardig?	_____
7a) Speelde X de baas?	.....	7b) Hoe bazig?	_____
8a) Vond X jou aardig?	.....	8b) Hoe aardig?	_____
9a) Vond X dat jij de baas speelde?	.....	9b) Hoe bazig?	_____
10a) Heb je vals gespeeld?	.....	10b) Hoe vals?	_____
11a) Heeft X vals gespeeld?	.....	11b) Hoe vals?	_____
Ik zag dat X de B-daman iets voor de streep zette) Weet je dat nog?			
12) waarom deed hij dat?	.....		
13) Deed hij dit expres/per ongeluk?	.....		
14a) Was dat gemeen bedoeld?	.....	14b) Hoe gemeen?	_____
15) Wat deed jij toen?	.....		
Het volgende spel is		<b>Domino</b>	
16a) Ben je daar goed in?	.....	16b) Hoe goed?	_____
17a) Denk je dat X er goed in is?	.....	17b) Hoe goed?	_____
18) Wie gaat er winnen, denk je?	.....		

Deelnemer: .....  
Datum: .....

Speelt met: .....  
Coach: .....

**Domino**

<i>Vragen</i>	<i>Antwoorden</i>	<i>Vragen</i>	<i>Schalen</i>
1) Hoe ging het?	.....		
2a) Vond je het leuk?	.....	2b) Hoe leuk?	_____
3a) Was je blij?	.....	3b) Hoe blij?	_____
4a) Was je boos?	.....	4b) Hoe boos?	_____
5a) Was je verdrietig?	.....	5b) Hoe verdrietig?	_____
6a) Vond je X aardig?	.....	6b) Hoe aardig?	_____
7a) Speelde X de baas?	.....	7b) Hoe bazig?	_____
8a) Vond X jou aardig?	.....	8b) Hoe aardig?	_____
9a) Vond X dat jij de baas speelde?	.....	9b) Hoe bazig?	_____
10a) Heb je vals gespeeld?	.....	10b) Hoe vals?	_____
11a) Heeft X vals gespeeld?	.....	11b) Hoe vals?	_____
Ik zag dat X alle stenen liet omvallen. Weet je dat nog?			
12) waarom deed hij dat?	.....		
13) Deed hij dit expres/per ongeluk?	.....		
14a) Was dat gemeen bedoeld?	.....	14b) Hoe gemeen?	_____
15) Wat deed jij toen?	.....		
Het volgende spel is		<b>Lego raket bouwen</b>	
16a) Ben je daar goed in?	.....	16b) Hoe goed?	_____
17a) Denk je dat X er goed in is?	.....	17b) Hoe goed?	_____
18) Wie gaat er winnen, denk je?	.....		

Deelnemer: .....  
Datum: .....

Speelt met: .....  
Coach: .....

### Lego raket bouwen

<i>Vragen</i>	<i>Antwoorden</i>	<i>Vragen</i>	<i>Schalen</i>
1) Hoe ging het?	.....		
2a) Vond je het leuk?	.....	2b) Hoe leuk?	_____
3a) Was je blij?	.....	3b) Hoe blij?	_____
4a) Was je boos?	.....	4b) Hoe boos?	_____
5a) Was je verdrietig?	.....	5b) Hoe verdrietig?	_____
6a) Vond je X aardig?	.....	6b) Hoe aardig?	_____
7a) Speelde X de baas?	.....	7b) Hoe bazig?	_____
8a) Vond X jou aardig?	.....	8b) Hoe aardig?	_____
9a) Vond X dat jij de baas speelde?	.....	9b) Hoe bazig?	_____
10a) Heb je vals gespeeld?	.....	10b) Hoe vals?	_____
11a) Heeft X vals gespeeld?	.....	11b) Hoe vals?	_____
Ik zag dat X alle goede blokjes pakte. Weet je dat nog?			
12) waarom deed hij dat?	.....		
13) Deed hij dit expres/per ongeluk?	.....		
14a) Was dat gemeen bedoeld?	.....	14b) Hoe gemeen?	_____
15) Wat deed jij toen?	.....		
Het volgende spel is		<b>Raket toren bouwen</b>	
16a) Ben je daar goed in?	.....	16b) Hoe goed?	_____
17a) Denk je dat X er goed in is?	.....	11b) Hoe goed?	_____
18) Wie gaat er winnen, denk je?	.....		

Deelnemer: .....  
 Datum: .....

Speelt met: .....  
 Coach: .....

**Raket toren bouwen**

<i>Vragen</i>	<i>Antwoorden</i>	<i>Vragen</i>	<i>Schalen</i>
1) Hoe ging het?	.....		
2a) Vond je het leuk?	.....	2b) Hoe leuk?	_____
3a) Was je blij?	.....	3b) Hoe blij?	_____
4a) Was je boos?	.....	4b) Hoe boos?	_____
5a) Was je verdrietig?	.....	5b) Hoe verdrietig?	_____
6a) Vond je X aardig?	.....	6b) Hoe aardig?	_____
7a) Speelde X de baas?	.....	7b) Hoe bazig?	_____
8a) Vond X jou aardig?	.....	8b) Hoe aardig?	_____
9a) Vond X dat jij de baas speelde?	.....	9b) Hoe bazig?	_____
10a) Heb je vals gespeeld?	.....	10b) Hoe vals?	_____
11a) Heeft X vals gespeeld?	.....	11b) Hoe vals?	_____
Ik zag dat X ... (de beste stenen pakte/ je uitlachte) Weet je dat nog?			
12) waarom deed hij dat?	.....		
13) Deed hij dit expres/per ongeluk?	.....		
14a) Was dat gemeen bedoeld?	.....	14b) Hoe gemeen?	_____
15) Wat deed jij toen?	.....		

