
Biased Mentalizing in Children Aged Seven to 11: Latent Class Confirmation of Response Styles to Social Scenarios and Associations with Psychopathology

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Abstract

A new approach to the measurement of mentalizing is introduced. Instead of measuring the presence or absence of mentalizing capacity, the current study aimed at developing a mentalizing task that focuses on investigating biases in mentalizing through the use of ambiguous peer-related social scenarios. The response consistency of 659 children was investigated in a community sample of children aged seven to 11. Confirmatory latent class analysis allocated children to three groups on the basis of their responses: an overly positive style (OP), a rational/neutral style (R) or an overly negative style (ON). Children classed as OP showed a greater likelihood of being above cut-off on a population screen for externalizing disorder. Over a two-year follow-up period, the children who were classified as R were most likely to remain so whereas the OP and ON children were found to change group. The results are discussed in the context of social-cognitive research in this age group. Further studies should examine the external validity of the mentalizing task because the results reported here concern only internal construct validity.

Keywords: mentalizing; externalizing disorder; social cognition; latent class analysis

Introduction

Over the last two decades there has been a burgeoning literature on cognitive models of information processing biases and its associations with symptoms of psychiatric disorder in children and adolescents (Bogels & Zigterman, 2000; Vasey, Dalgleish & Silverman, 2003). Similar to what has been observed in adult populations, different emotional disorders seem to associate with different patterns of biased information processing in childhood (Ingram, Miranda & Segal, 1998; Vasey et al., 2003; Williams,

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Watts, MacLeod & Matthews, 1988, 1997). For instance, anxious, but not mixed anxious-depressed children show attentional biases in response to threat stimuli (Neshat Doost, Taghavi, Moradi, Yule & Dalgleish, 1997; Taghavi, Neshat Doost, Moradi, Yule & Dalgleish, 1999; Vasey, Daleiden, Williams & Brown 1995; Vasey, Elhag & Daleiden, 1996). Whereas anxiety is related to attentional biases for anxiety-congruent material, depression seems to be related to memory biases for depression-related material (Goodyer & Sharp, 2005; Kaslow, Rhem, Pollack & Alexander, 1990; Kelvin, Goodyer, Teasdale & Brechin, 1999; McCauley, Mitchell, Burke & Moss, 1988; Neshat Doost, Taghavi, Moradi, Yule & Dalgleish, 1998; Quiggle, Garber, Panak & Dodge 1992; Seligman et al. 1984).

Although the above research reflects cognitive biases that are not exclusively social in nature, research on cognitive biases related to externalizing behaviour has focused most prominently on biases in social information processing social information processing. For example, Dodge (1993) and Pettit, Polaha and Mize (2001) have described a range of maladaptive social information processing, including biased attention and encoding of hostile stimuli, intention-cue detection errors, hostile-attributional biases, inadequate response search and problem-solving and biased response evaluation in the form of expectations of the favourable outcomes for aggression. Similar patterns of results have been found for oppositional children who have been shown to interpret ambiguous social situations as more threatening compared with non-clinical children (Barrett, Rapee, Dadds & Ryan, 1996).

Parallel to the development in the literature on the information processing styles associated with psychopathology has been the development of a new literature on mentalizing capacity. *Mentalizing* refers to an individual's ability to understand or reflect on the context of, or the causes of, self and others' thoughts and feelings (Fonagy, Steele, Moran, Steele & Higgitt, 1991). This term is preferred in the current study above several other terms that refer to the same construct (e.g., social understanding, theory of mind) because it is slightly more general and not limited to specific tasks or age groups (O'Connor & Hirsch, 1999). In contrast to early research in mentalizing—which addresses the question of whether children are able to understand others' thoughts—more recent studies have looked into whether children misperceive the thoughts, feelings and intentions of others (O'Connor & Hirsch, 1999). In these studies, new methods of measuring misperceptions or testing for biases are under development (e.g., Sharp, Fonagy & Goodyer, 2006). Researchers pursuing this line of enquiry argue for a distinction between (1) understanding that beliefs depend on having access to information, that is, false belief comprehension and (2) the more complex understanding that even with access to the same information, people may interpret it differently and thus end up with different beliefs, an insight achieved at around middle school age (Carpendale & Chandler, 1996; Chandler & Carpendale, 1998; Chandler & Lalonde, 1996; Sharp, 2006).

Despite the obvious overlap between the cognitive bias literature on childhood psychopathology and the interest in developing approaches to studying biases in mentalizing, combining these two literatures have not been explicitly reflected in measure design. Yet it is reasonable to argue that individuals suffering from emotional or behaviour disorders may be engaged in maladaptive or biased mentalizing. Indeed, it can be hypothesized that information processing of this sort may be a factor in the aetiology of a condition, or of its maintenance. Not only, as suggested by attribution theory, are at-risk individuals likely to misinterpret or make false attributions regarding the reasons for events (like failing a test), but they may misinterpret the thoughts of

others in relation to themselves in the context of a social event. One class of maladaptive mentalizing that may therefore occur is through self-attribution or self-appraisal processes (Sharp et al., 2006). Research on maladaptive attributional styles has shown that when interpreting the causes of events ('why do you think it happened?'), children and adolescents with emotional disorders attribute them to internal, stable and global causes (Quiggle et al., 1992; Seligman et al., 1984). The same process may occur when interpreting the thoughts of others in social situations in relation to the self ('what do you think they will think of you if this happens to you?').

Our primary aim was therefore to develop a child-focused mentalizing task to classify children according to three types of mentalizing response styles: rational or neutral (R), overly negative (ON) and overly positive (OP). Our second aim was to investigate the associations between the three mentalizing response styles and child psychopathology. To this end, we first explain what is meant by 'rational' and 'biases' in the context of the current article. Based on literatures that have linked rational thinking with psychological health (Beck, 1995; Ellis, 1975; Wells, 1997), we hypothesized that children who engaged in rational or neutral (R) mentalizing would not be at risk for psychopathology and would therefore be below cut-off on symptoms of emotional or behaviour problems. Cognitive-behaviour therapy literature (Beck, 1995; Ellis, 1975; Wells, 1997) suggests that (1) rational thinking does not necessarily relate to the truth and (2) it is devoid of global, negative and stable self-attribution. Even if you are the worst footballer in your class, it is good for you not to attribute this to your self in a globally negative, internal and stable way (e.g., 'They would think I am always a loser') but rather to engage in what is called 'rational' or 'helpful' thinking, characterized by a non-self-referent (external), non-stable type interpretation (e.g., 'They would think I might have better luck next time'). It is equally unhealthy to attribute globally positive thoughts to the self as these may set you up for disappointment when evidence contrary to your belief becomes apparent (Baumeister, Smart & Boden, 1999; Hughes, Cavell & Grossman, 1997). In other words, we hypothesized that making self-attributions that are OP or ON in the context of mentalization, where the implications for self were ambiguous, may associate with poor mental health. In contrast, an R style devoid of self-attribution may be seen as a coping style, akin to helpful, functional or adaptive automatic thoughts discussed in cognitive-behaviour therapy literature.

More specifically, and based on the literature suggesting that children with symptoms of depression and anxiety show negative cognitive biases (Barrett et al., 1996; Quiggle et al., 1992), we hypothesized that children with emotional symptoms would show ON biases in their mentalizing. In contrast, several authors have demonstrated that aggressive children (David & Kistner, 2000; Hughes et al., 1997; Hughes, Cavell & Prasad Gaur, 2001; Hymel, Bowker & Woody, 1993; Kupersmidt, Burchinal & Patterson, 1995) and adults (Baumeister, Smart & Boden, 1996, 1999) tend to idealize and inflate ratings of their own competence and relationship quality. We therefore hypothesized that children with externalizing behaviour symptoms would display OP mentalizing response styles.

Assuming an association between mentalizing response styles and symptoms of pathology, we further aimed to investigate the role of IQ, sex and age in this association. These variables have been suggested to relate to both externalizing (Hill, 2002) and internalizing (Goodyer & Sharp, 2005) problems. Moreover, mentalizing has been shown to correlate with verbal ability (Meins, Fernyhough, Wainwright, Das Gupta, Fradley & Tuckey, 2002) and sex (Baron Cohen, Jolliffe, Mortimore & Robertson, 1997; Bosacki 2000) whereas a developmental age effect has been observed in biased

views of the self, with young children (age 4–7) typically holding OP self-perceptions (Damon & Hart, 1988; Harter, 1999). At around eight years old, children's self-perceptions start to show congruence between self-perceptions and objective indicators (Berndt & Burgy, 1996; Damon & Hart, 1988; Marsh, Craven & Debus, 1991). In investigating the relationship between biased mentalizing and psychopathology, it is therefore necessary to control for the confounding effect these variables may have.

Our third aim was to examine change in mentalizing response style, or more specifically, the latent class allocation of children to the three response styles (R, OP or ON), when retested two years later with the same set of social scenario items. The justification for this aim lies in the notion that the ontogeny of information processing biases related to psychological disorder can be traced back to childhood. Beck (1995) was one of the first to suggest that cognitive structures are conceptualized as being over-activated during the development of disorder such that they act as filters to information processing in line with schema-congruent elements in the environment. These schemas regarding the self and the world are seen to be stable, enduring traits which bias information processing in systematic ways. Little is known, however, regarding the change or stability of biased information processing in children. Neshat et al. (1998) demonstrated an age effect in the strength of the association between depression and memory bias for negative information, and suggested that self-schemas become increasingly elaborated between the ages of 10 and 17 and consequently play a greater role in the maintenance of depressive symptoms. If mentalizing response styles can be demonstrated to be stable features of how children approach the social world, these may also play a role in the maintenance of symptoms.

In summary, the aims for the current study involved (1) the development of an internally consistent child-focused mentalizing task that is sensitive for biases in mentalizing response styles; (2) investigating the relationship between biases in mentalizing and symptoms of emotional and behaviour problems, while controlling for the effects of IQ, sex and age and (3) examining the latent class allocation of children to the three response styles two years after baseline.

Methods

Participants

The parents of 2,950 seven- to 11-year-olds (primary school years three to six) of 16 primary schools from a mixed catchment of rural and urban areas in Cambridgeshire, UK, were asked to participate. The response rates for individual schools ranged from 14 to 40 per cent, resulting in 20 per cent of the children taking part in the study ($n = 659$; 319 boys and 340 girls).

There are four possible reasons to explain the low response rate. Firstly, the ethics approval requirements prohibit researchers from gaining access to the names and addresses of parents in the community. Invitation letters to participate in the study were therefore handed out to children at school to take home to their parents. It is possible that many invitation letters did not make it home in the first place. Secondly, ethics in the UK require positive consent. The effort of actually completing and returning a consent form to indicate positive consent may be too much to ask of parents in the community. Thirdly, limited resources precluded payment to children for their participation. Instead, the children were given a sticker and were entered into a school raffle

draw for participation. Fourthly, it is possible that parents feel more protective of children in the below-11 age range compared with adolescents, where the response rate for community studies using school-based ascertainment procedures in the UK is typically 50 per cent (Goodyer et al., 2000).

Two procedures were employed to determine whether the low response rate introduced a bias into the recruitment procedure. Firstly, permission was granted from the school board of one of the schools for teachers to complete a child behaviour measure—the strengths and difficulties questionnaire—SDQ (Goodman, 1997, 2001; Goodman, Ford, Simmons, Gatward & Meltzer, 2000) on all the children in the school. Those children whose families volunteered could then be compared with the children whose parents did not volunteer. Non-parametric independent sample *t*-tests (at significance levels .05) showed no significant differences between the volunteers ($n = 61$) and non-volunteers ($n = 232$) on the SDQ total difficulties score and all five subscales of the SDQ (hyperactivity, emotional symptoms, conduct problems, peer problems, prosocial).

Secondly, a comparison of socio-demographic characteristics were examined. The ethnic distribution in the sample was in line with regional statistics (Office of National Statistics, 1991) for eastern England (97 per cent White, 2 per cent Asian, .5 per cent Black and .5 per cent Oriental). To determine socio economic status we used a geodemographic tool called A Classification of regional neighbourhoods (ACORN), which is freely available on the Internet. ACORN categorizes all 1.9 million UK postcodes, which have been described using over 125 demographic statistics within England, Scotland, Wales and Northern Ireland, and 287 lifestyle variables, making it a powerful discriminator for social class. According to ACORN, our sample comprised of 40 percent wealthy achievers, 9 percent urban prosperity, 28 percent comfortably well-off, 9 percent moderate means and 14 percent hard pressed. According to the Office of National Statistics (1991), this is typical for eastern England. The mean age of the sample was nine years three months ($SD = 1$ year 2 months), with 12 percent ($n = 83$) seven-year-olds, 23 percent ($n = 153$) eight-year-olds, 26 percent ($n = 169$) nine-year-olds, 27 percent ($n = 174$) 10-year-olds and 12 percent ($n = 80$) 11-year-olds. The mean IQ was 105 ($SD = 15$) and all children had IQs above 80.

Measures

Mentalizing Task

Task Construction. As a first step in the development of the task, a set of potentially distressing peer-related scenarios were presented to a pilot sample of 106 children. We limited the context for mentalizing to the peer environment for two reasons. Firstly, one important domain in which mentalizing ability can develop is peer relations (Bosacki & Astington, 1999). Secondly, recent research has suggested contextual (situational) variation in mentalizing across settings or relationships (Humfress, O'Connor, Slaughter, Target & Fonagy, 2002).

Similar to other methods of this type (Steele, Steele & Johansson, 2002) the themes drew on typical life experiences that may cause unhappiness or distress by depicting emotional and/or physical hurt and social conflict. These also reflect Harter's (1999) self-esteem domains to ensure emotional salience. They included loneliness, ridicule, being singled out, under-achievement in sport, having an accident, experiencing loss, social exclusion, academic under-achievement, physical size, moving to a new school,

physical disability, social embarrassment, experiencing divorce, poverty and peer rejection.

Many studies have shown that children prefer same-sex friendship to cross-sex friendship (Gottman, 1986; Maccoby, 1988; Smith & Inder, 1990). For this reason, and to aid identification with the target character in the story, we developed gender-specific versions of the task, although the stories remained the same for each gender.

The participants imagined themselves to be the target character in the story (e.g., 'Imagine you do the worst in your class on your SATs'). Children were asked in an open-ended question to attribute thoughts to their imaginary peers ('What do you think the other children would think about you if this happened to you?'). Thus, the pilot version of the task was developed in the tradition of projective, open-ended narrative tasks (Fox, 1991; Selman, 1980). By asking children an open-ended question, no *a priori* assumptions were made regarding the content of children's responses. All responses were tape-recorded and transcribed. Transcriptions are available from the first author.

The Final Version of the Task. From the pilot data, the most common modal responses to the open-ended questions for each scenario and in each category (overly negative = ON, overly positive = OP, rational/neutral = R) were subsequently identified. In line with other studies using this method (Clarbour & Roger, 2004), we ensured that the content would remain meaningful for children of this age group by retaining the linguistic flavour and content used by the participants themselves. The final version of the task presented to the current sample was therefore a forced-choice task, following the tradition of some recent higher-order theory of mind tasks (Baron Cohen, Wheelwright, Hill, Raste & Plumb, 2001).

The final version of the task included 15 vignettes. During an individual testing session that lasted 10 to 15 minutes per child, a researcher read out the story aloud to the children alongside the associated line drawings. The stories were also printed on the answer sheet so that the children could read the story themselves as the researcher presented it. The three response options were read out loud to the child while the child read it in print on his/her answer sheet. The child was then asked to circle the one s/he agreed with most. The stories and response options were repeated if necessary. Because of the care taken in ensuring that children followed the story and were clear on the response options, not even the seven-year-olds reported any difficulty handling the amount of information presented to them and they all found the task easy and enjoyable to complete. Two examples of stimuli with associated cartoons are presented as an Appendix.

Scoring of the Task. To determine the overall child attributional style across all 15 scenarios, we had to develop a way of deriving a summary score for the task as a whole. The three response options do not lie on a continuous metric (therefore precluding a simple addition of scores) but rather reflect one of three mutually exclusive categories: (1) an unrealistic and OP bias with strong self-reference (e.g., 'They would think I'm cool not to play silly games with the rest of the kids'), (2) an ON bias with strong self-reference (e.g., 'They would think nobody likes me') or (3) a neutral/rational/adaptive option devoid of a global, internal, and stable self-attribution (e.g., 'They would think I'm just sitting down to have a think and a rest').

One option for deriving a summary score is to impose arbitrary thresholds on the data (for instance, if a child had 10 or more out of 15 positive responses, the child

would be assigned to the positive class etc.). However, a more sophisticated and rigorous approach to data reduction that takes into account all data points is to employ latent class modelling techniques (latent class analyses).

Latent class analysis (LCA) is a multivariate technique that can be applied in the manner of a model-based cluster analysis to group individuals (Garson, 2004). It is based on the notion that some of the parameters of a postulated statistical model differ across unobserved subgroups (Vermunt & Magidson, 2000). LCA is thus a statistical method for finding groups in multivariate categorical data. For example, it can be used to find diagnostic categories given the presence/absence of symptoms or types of attitude structures from responses to surveys or tests. The results of LCA can be used to classify cases to their most likely latent class. LCA is often used in a manner analogous to cluster analysis—to find groups in data that share similar characteristics. From this perspective, LCA can be seen as a model-based form of cluster analysis. The classes are categories of a latent variable that underpin responses to test or inventory items.

We employed cross-tabulations, analysis of variance (ANOVA) and regression for all other analyses.

Parent- and Teacher-reported Psychopathology

The parents of 617 children and teachers of 570 children completed the SDQ (Goodman et al., 2000; Goodman, 1997, 2001). The SDQ was specifically designed to screen for psychiatric disorders in community samples. SDQ predictions and independent psychiatric diagnoses were compared in a community sample of 7,984 children (aged five to 15 years) from the 1999 British Child Mental Health Survey and was shown to identify individuals with psychiatric diagnosis with a specificity of 94.6 percent (95 percent CI 94.1–95.1 per cent) and a sensitivity of 63.3 per cent (59.7–66.9 percent; Goodman et al., 2000). Sensitivity for the SDQ has been demonstrated to be especially good (70 to 90 per cent) for the identification of conduct-oppositional disorders and hyperactivity disorders. The informant-rated SDQ has been shown to perform comparably to the child behavior checklist (Achenbach, 1991), despite being faster to administer (Goodman & Scott, 1999).

The questionnaire consists of 25 items that form five subscales of five items each. Five subscale scores are generated for emotional symptoms, conduct problems, hyperactivity-inattention, peer problems and prosocial behaviour. The most commonly used summary score is for SDQ total difficulties: the sum of all items in the first four scales. For the current analysis, we will use both the SDQ total difficulties score and the individual subscales scores that relate to psychopathology. As we are interested in the mentalizing task's power to detect children who will be above cut-off on a population screen for psychopathology, we use cut-off scores that are provided by the authors of the SDQ based on normative data for the total difficulties and four psychopathology subscale scores. These cut-off scores are freely available on the SDQ website (www.sdqinfo.com).

IQ

A shortened version (vocabulary and block design) of the Wechsler intelligence scale for children (Wechsler, 1992) was used to determine IQ. It was individually administered and total IQ scores were derived using Sattler's (1988) method. Five children

chose not to complete the IQ tests. The sample size for analyses including IQ is therefore $N = 654$.

Results

Internal Construct Validity

Three Latent-class Model. The use of the LCA enabled us to classify children as either ON, OP or R on the basis of their responses. In doing so, it also provided us with a method of investigating the internal consistency of the task. Here, we defined internal consistency as the ability of the three response options in each item (ON, OP, R) to load onto one of three underlying classes (ON, OP, R), depending on the response option chosen by the child. In other words, to test whether the measure met its design aims (eliciting one of three response styles), we specified a simple unrestricted latent class model as a probability model. That is, we determined the probabilities that three subgroups (OP, ON, R) captured by a latent class variable with three classes (representing mentalizing response style) underlay responses on the 15 items of the mentalizing task; here, these were the manifest or observed variables. The observed variables were treated as nominal (unordered) in that the children chose one of three mutually exclusive categories (ON, OP, R) that best represented their response. The task would therefore show internal consistency if high probabilities could be demonstrated for choosing a certain response (e.g., ON) depending on class membership. As such, we tested only whether the data fits this simple three class model.

The analyses were carried out in LEM (Vermunt, 1997), a statistical package that is freely available on the Internet. Parametric bootstrapping to provide an exact p -value for chi-square tests of model fit was performed using Latent Gold 3.0 (Vermunt & Magidson, 2000).

The results showed that the children did indeed separate into three groups: 38 percent negative response style, 36 percent neutral response style and 26 percent positive response style. The bootstrap p -value (from 1000 replications) was .306, which is non-significant ($>.05$) thereby indicating a good fit.

In Table 1 we report the latent class model parameters. These comprise (1) the *conditional probabilities* of each level of response (OP, ON, R) for each class (OP, ON, R) derived from the LCA and (2) the *unconditional probabilities*, which refer to the class sizes (or prevalence of the latent classes in the sample).

These values can be interpreted in the following way: for example, for Scenario 2, the probability of endorsing an ON response given ON class membership was higher than for the other types of responses (.51 vs. .34 and .14); the probability of endorsing an R response given R class membership was higher than for the other type of responses (.61 vs. .18 and .21); the probability of endorsing an OP response given OP class membership was higher than for the other type of responses (.49 vs. .28 and .23).

Profile of SDQ Scores by Latent Classes

Descriptive Statistics. Table 2 summarizes the descriptive statistics for all SDQ measures (including the subscale and total SDQ scores), alongside published normative means and SDs for the SDQ (www.sdqinfo.com).

Table 1. Latent Class Probabilities (Class Sizes and Class Specific Conditional Probabilities for each Level of Response: Negative, Neutral, and Positive) for each Class (1, 2, 3)

Unconditional probabilities/ Class sizes	Class 1 Negative	Class 2 Neutral	Class 3 Positive
	38%	36%	26%
<i>Scenario 1: loneliness</i>			
negative	.56	.36	.50
neutral	.42	.62	.38
positive	.02	.03	.12
<i>Scenario 2: ridicule</i>			
negative	.51	.18	.28
neutral	.34	.61	.23
positive	.14	.21	.49
<i>Scenario 3: being singled out</i>			
negative	.30	.04	.14
neutral	.58	.74	.40
positive	.12	.22	.45
<i>Scenario 4: under-achievement in sport</i>			
negative	.29	.02	.13
neutral	.57	.89	.69
positive	.13	.09	.18
<i>Scenario 5: having an accident</i>			
negative	.46	.22	.26
neutral	.33	.74	.55
positive	.21	.03	.19
<i>Scenario 6: experiencing loss</i>			
negative	.13	.05	.25
neutral	.71	.85	.49
positive	.16	.10	.27
<i>Scenario 7: academic under-achievement</i>			
negative	.63	.08	.20
neutral	.19	.66	.31
positive	.19	.26	.49
<i>Scenario 8: social exclusion</i>			
negative	.43	.08	.14
neutral	.29	.37	.22
positive	.27	.55	.64
<i>Scenario 9: physical size</i>			
negative	.77	.20	.28
neutral	.19	.76	.41
positive	.04	.04	.31

Table 1. Continued

Unconditional probabilities/ Class sizes	Class 1 Negative	Class 2 Neutral	Class 3 Positive
	38%	36%	26%
<i>Scenario 10: moving to a new school</i>			
negative	.13	.00	.06
neutral	.77	.83	.65
positive	.10	.17	.28
<i>Scenario 11: physical disability</i>			
negative	.56	.16	.24
neutral	.29	.62	.29
positive	.15	.22	.45
<i>Scenario 12: social embarrassment</i>			
negative	.43	.06	.12
neutral	.49	.85	.45
positive	.08	.09	.34
<i>Scenario 13: experiencing divorce</i>			
negative	.35	.04	.19
neutral	.53	.81	.32
positive	.11	.14	.49
<i>Scenario 14: poverty</i>			
negative	.24	.03	.11
neutral	.59	.69	.27
positive	.17	.28	.61
<i>Scenario 15: peer rejection</i>			
negative	.31	.03	.13
neutral	.36	.75	.39
positive	.34	.22	.48

Note: Latent class labels are based on (i) the *a priori* hypothesis for the three classes and (ii) the pattern of conditional response probabilities for the items.

Comparisons between the means and *SDs* in the current sample and those made available for norms by the authors of SDQ (www.sdqinfo.com) showed that for teacher report, means and *SDs* were almost identical between our sample and that of the normative sample. However, with regard to parent report, the current sample showed elevated scores compared with the normative sample.

SDQ Total Difficulties Score by Latent Class. We investigated whether class membership was associated with above cut-off status on the SDQ (Goodman et al., 2000; Goodman, 2001). The results of a cross-tabulation analysis of class membership by case status on the SDQ total score is presented as a clustered bar chart in Figure 1.

For parent reports, of the children who were below cut-off, 32.4 per cent were in the negative class, 29.6 per cent in the neutral class and 18.1 per cent in the positive class.

Table 2. Descriptive Statistics for SDQ Total Difficulties and Subscale Scores

	<i>M (SD)</i>	<i>M (SD)</i>	% above cut-off
	Current sample	Normative sample*	Current sample
T-hyperactivity	2.58 (1.82)	2.9 (2.8)	11.6
T-emotionality	1.82 (2.18)	1.4 (1.9)	6.5
T-conduct	.91 (1.56)	.9 (1.6)	7.8
T-peer problems	1.45 (1.87)	1.4 (1.8)	7.5
T-total difficulties	6.77 (6.28)	6.6 (6.0)	7.8
P-hyperactivity	4.10 (1.48)	3.5 (2.6)	6.0
P-emotionality	2.26 (2.14)	1.9 (2.0)	13.3
P-conduct	2.63 (1.24)	1.6 (1.7)	16.4
P-peer problems	4.65 (1.18)	1.5 (1.7)	7.0
P-total difficulties	13.65 (3.82)	8.4 (5.8)	17.2

T = teacher reported; P = parent reported.

*Norms: British means and standard deviations (www.sdqinfo.com).

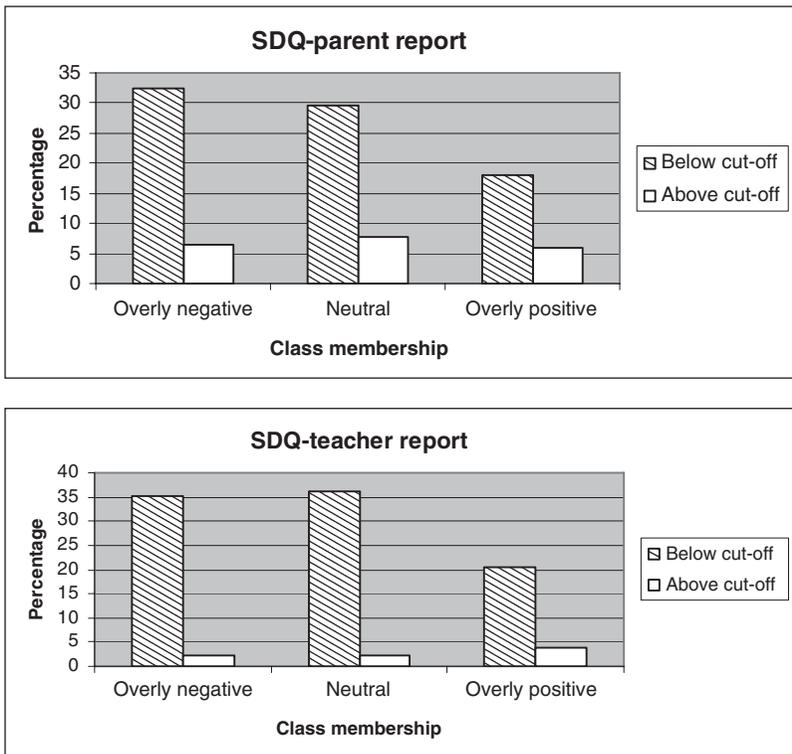


Figure 1. Relationship between Class Membership and SDQ Total Difficulties Scores.

Of those above cut-off, 6.4 per cent were in the negative class, 7.8 per cent were in the neutral class and 5.8 per cent in the positive class.

For teacher reports, of the children who were below cut-off, 35.1 per cent were in the negative class, 36.2 per cent were in the neutral class and 20.6 per cent in the positive class. Of the children above cut-off on the SDQ (teacher reports), 2.1 per cent were in the negative class, 2.1 per cent in the neutral class and 3.8 per cent in the positive class. Clearly, an over-representation of children above cut-off was found for the positive class.

Chi-square analyses confirmed the above. For parent reports, the likelihood of being above cut-off did not show significant variation according to class membership ($\chi^2 = 3.49$; $df = 2$; $p = .17$). However, for teacher reports, membership of the OP class increased the likelihood of being above cut-off whereas membership of the R or ON class increased the likelihood of being below cut-off ($\chi^2 = 14.71$; $df = 2$; $p = .001$). Inspection of the adjusted residuals (Everitt, 1995) for each cell of the 2×3 cross-tabulation identified an excess (more than expected under the null hypothesis) of SDQ total difficulties above cut-off scores for children who were in the OP class ($z = 3.8$). The results suggest that membership in the OP class is most strongly associated with being above cut-off.

SDQ Subscale Scores by Latent Class. Pearson chi-square statistics were calculated to investigate the association between latent classes and cut-offs for teacher-reported SDQ subscales (hyperactivity, conduct, emotionality, peer problems). Class membership was significantly related to being above cut-off on three of the four subscales: hyperactivity ($\chi^2 = 12.57$; $df = 2$; $p = .002$), emotionality ($\chi^2 = 6.63$; $df = 2$; $p = .4$) and conduct ($\chi^2 = 8.66$; $df = 1$; $p = .01$). Inspection of the adjusted residuals (Everitt, 1995) for each cell of the 2×3 cross-tabulation for each subscale by class membership identified an excess in above cut-off scores for children who were in the OP class.

For parent-reported SDQ subscale scores, chi-square statistics showed that class membership was associated with above cut-off scores for the conduct scale only ($\chi^2 = 12.88$; $df = 2$; $p = .002$). As with the teacher report, inspection of the adjusted residuals showed it was the children who were in the OP class that were more likely to be above cut-off.

IQ, Sex and Age by Latent Class

The results of one-way ANOVAs with class membership as the independent variable and IQ and age as the dependent variables showed a clear main effect for IQ, $F(2,654) = 12.83$, $p < .001$, and age in months, $F(2,654) = 31.68$, $p < .001$. Significance values for the mean differences in a *post hoc* analysis (Tukey test) showed that children in the ON and R classes had similar IQs ($p = .87$) whereas children in the OP class had significantly lower IQs than children in the R ($p < .001$) and the ON ($p < .001$) classes. *Post hoc* analyses further showed that children in the ON class were significantly older than children in the neutral class ($p = .02$), who in turn were significantly older than children in the OP class ($p < .001$).

To investigate the relationship between class membership and sex, chi-square analyses were conducted on cross-tabulations. A moderately significant association was found ($\chi^2 = 7.32$; $df = 2$; $p = .03$). Inspection of the adjusted residuals (Everitt, 1995) for each cell of the 2×3 cross tabulation identified an excess (more than expected under the null hypothesis) of boys who were in the R class ($z = 2.6$).

The Association between Biased Mentalizing and Psychopathology while Controlling for the Effect of IQ, Sex and Age

To further investigate the relationship between psychopathology and biased mentalizing, we carried out a series of logistic regressions for the psychopathology variables, which showed promise in the bivariate analyses described above.

A logistic regression with the binary SDQ total difficulties variable (teacher report) as response variable and mentalizing response style (three categories), age, sex (two categories) and IQ as independent variables showed that the best fit for the model was additive with IQ, $B = -.04$ ($SE = .009$), $Wald = 14.77$, $df = 1$, $p < .001$, $OR = .96 \pm .95 - .98$; sex, $B = .95$ ($SE = .33$), $Wald = 8.13$, $df = 1$, $p = .004$, $OR = 2.58 \pm 1.35 - 4.96$; and mentalizing response style, $Wald = 7.35$, $df = 2$, $p = .02$; OP category, $B = .93$ ($SE = .40$), $Wald = 5.47$, $df = 1$, $p = .019$, $OR = 2.54 \pm 1.16 - 5.54$. Age was dropped from the model. Thus, being male, having a lower IQ and an OP mentalizing response style increased the likelihood of being above cut-off on the SDQ total difficulties scale.

When teacher-reported hyperactivity was entered as the outcome variable, similar results were returned: IQ, $B = -.03$ ($SE = .008$), $Wald = 15.91$, $df = 1$, $p < .001$, $OR = .97 \pm .95 - .98$; sex, $B = 1.08$ ($SE = .28$), $Wald = 14.93$, $df = 1$, $p < .001$, $OR = 2.96 \pm 1.70 - 5.12$; and mentalizing response style, $Wald = 7.43$, $df = 2$, $p = .02$; OP category, $B = .80$ ($SE = .34$), $Wald = 5.73$, $df = 1$, $p = .017$, $OR = 2.24 \pm 1.18 - 4.32$, with age dropped from the model.

Mentalizing response style was also retained in the model with teacher-reported conduct scores as outcome variable: IQ, $B = -.03$ ($SE = .009$); $Wald = 12.53$; $df = 1$; $p < .001$; $OR = .97 \pm .95 - .99$; sex, $B = .77$ ($SE = .32$); $Wald = 5.74$; $df = 1$; $p = .017$; $OR = 2.17 \pm 1.15 - 4.11$; and mentalizing response style, $Wald = 6.04$, $df = 2$, $p = .049$; R category: $B = -1.07$ ($SE = .44$), $Wald = 5.89$, $df = 1$, $p = .01$, $OR = .34 \pm .14 - .81$. Thus, being male, having a lower IQ and reduced likelihood of R-class membership, increased the likelihood of being above cut-off on the conduct scale.

For teacher-reported emotionality, however, the only variable retained in the model was IQ, $B = -.03$ ($SE = .01$), $Wald = 7.68$, $df = 1$, $p < .006$, $OR = .97 \pm .95 - .99$. All other variables were dropped from the model.

When parent-reported conduct scores were entered as the outcome variable, the same pattern of results were found. The best fit was for an additive model with IQ, $B = -.03$ ($SE = .007$); $Wald = 15.15$; $df = 1$; $p < .001$; $OR = .97 \pm .96 - .99$; sex ($B = .51$ ($SE = .23$); $Wald = 4.99$; $df = 1$; $p = .02$; $OR = 1.66 \pm 1.06 - 2.58$); and mentalizing response style, $Wald = 6.79$; $df = 2$; $p = .03$; R category: $B = -.74$ ($SE = .29$); $Wald = 6.34$; $df = 1$; $p = .01$; $OR = .48 \pm .27 - .85$.

Change in Mentalizing Response Style at Two-year Follow-up

A sub-sample comprising children from two of the participating schools ($N = 114$; mean age = 11 years seven months; $SD = 11$ months) was followed up two years after baseline. As the children were older, and because the children showed no difficulty with completing the task at baseline, data collection was done by post.

A second unrestricted latent class model with three classes was estimated for the 15 responses obtained at follow-up. This also yielded a solution consistent with three latent response styles. These results (class membership) were used to examine

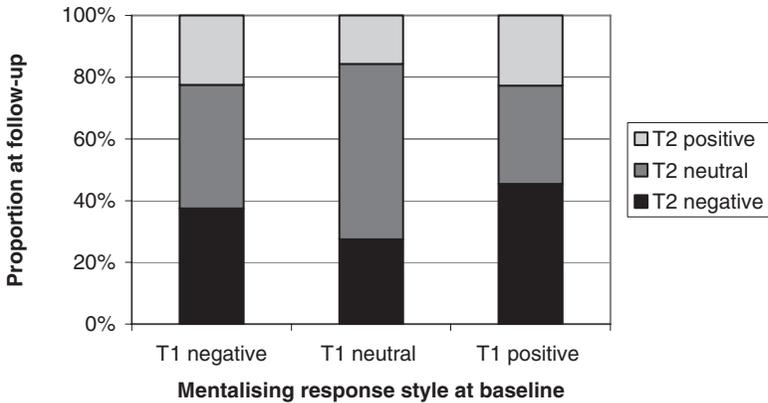


Figure 2. Transitions between Latent Classes over a 2-year Follow-up in a Subset of the Sample (N = 114).

transitions between latent classes over time. Full details of the model parameters for the follow-up LCA are available from the first author.

A chi-square analyses with class membership at baseline \times class membership at follow-up revealed no association between the two variables. However, scrutiny of the cell frequencies showed more overlap between the two time points for the R class compared with the ON and OP classes. For ease of interpretation we have represented changes over time in Figure 2.

In Figure 2, 38 percent of children in the ON class at Time 1 remained in the ON class two years later. Forty percent of those children moved to the R class at follow-up whereas 22 percent moved to the OP class. Of the children in the R class, 57 percent remained in the R class whereas 27 percent moved to the ON class and 16 percent moved to the OP class. Twenty-two percent of children who were in the OP class at Time 1 remained in the OP class. Most of the remaining children moved to the ON class (46 percent) and a smaller proportion moved to the R class (13 percent). Of the three classes, membership of the R class therefore showed greatest overlap between the two time points.

Discussion

Research on mentalizing has traditionally been limited to assessments of infants and preschool children (Humfress et al., 2002). Happé and Frith (1996) suggested that alternative methods are needed to distinguish individual differences in mentalizing in older children. Some researchers (Bosacki & Astington, 1999; Fonagy et al. 1991; O'Connor & Hirsch, 1999) have argued that, with older children, *sophistication* in understanding the contexts and causes of mental states is central to social competence, resilience and well-being. Others (Happé & Frith, 1996; O'Connor & Hirsch, 1999; Sharp, 2006; Sharp et al. 2006) have suggested that *biases* or distortions in mentalizing may also play a role. For example, Happé and Frith (1996) suggested that children with behaviour problems may show intact, but biased or skewed mind reading.

As opposed to researchers who have classified the attribution of intentions to peers as either 'hostile' or 'accidental' (Coy, Speltz, DeKlyen & Jones, 2001; Dodge, 1980),

we used an ON, ON and R classification system, similar to other studies that have used positive/negative bias classification systems in studying childhood psychopathology (Daleiden, Vasey & Williams, 1996; Kazdin, 1990; Malcarne & Ingram, 1994; Ronan, Kendall & Rowe, 1994), and one study that coded mentalizing responses as positive or negative (O'Connor & Hirsch, 1999).

To this end, we developed a forced-choice mentalizing task that was aimed at providing internally consistent means for assessing different domains of social-cognitive response style (ON, OP, R) when children are prompted to mentalize regarding the content of their peers' minds in the context of a distressing event. We used a latent class modelling technique in the manner of model-based cluster analysis to investigate internal consistency and found that a three-class latent structure (ON, OP, R) consistent with our design aims was confirmed. All scenarios fulfilled the design aims in that three mutually exclusive response styles in mentalizing could be elicited. Class membership was associated with giving a response hypothesized to be related to that particular class. In this sense, the task can be considered to have good internal consistency and validity.

Although LCA has been available for use for over 30 years (Vermunt & Magidson, 2000), it is rarely applied in child development studies despite its potential and usefulness. As demonstrated here, LCA may offer a powerful extension of cluster analysis in social cognitive research where the aims are to develop ways of grouping individuals by their response styles to social stimuli such as stories, pictures or vignettes.

Our second aim was to investigate the relationship between biases in mentalizing and symptoms of emotional and behaviour problems. Even when controlling for the effects of IQ, sex and age, which, at the bivariate level showed an association with biased mentalizing, we demonstrated in a series of logistic regressions that an OP response style and the absence of an R mentalizing response style are associated with symptoms of externalizing disorder. The results showed that membership in the positive class is associated with an increased likelihood of being above cut-off on a population screen for psychopathology. Such children were rated by teachers as above cut-off on the SDQ total difficulties and SDQ subscale scores (hyperactivity and conduct). Furthermore, they were rated by their parents as above cut-off for conduct problems. This latter finding should perhaps be treated with caution. Although the means and *SDs* on the SDQ for our study were almost identical for teacher-reported SDQ scores, parent-reported scores were elevated. There is no easy explanation for why parents, but not teachers, rated the children in our sample as more deviant compared with Goodman's normative sample, but it does suggest that the teacher ratings are more reliable.

Although our study is the first to report a relationship between an OP style in mentalizing and behaviour problems, other studies have reported relationships between over-estimation of peer acceptance and peer nomination for aggression in elementary school children (David & Kistner, 2000). Hughes and colleagues (Hughes et al., 1997, 2001) have also noted a tendency for aggressive children to idealize and inflate ratings of competence and relationship quality. Children who are both rejected by their peers and are aggressive have been found to have positively distorted perceptions of their social and behavioural competencies whereas rejected, non-aggressive children have accurate self-perceptions (David & Kistner, 2000; Hymel et al., 1993; Kupersmidt et al., 1995). Although negative distortion in social-cognitive style relates to depressive symptoms in adolescence (Gladstone, Kaslow, Seeley & Lewinsohn, 1997; Kaslow et al., 1990; McCauley et al., 1988; Seligman et al., 1984; Teasdale, 1988), our

findings add to a body of emerging evidence that positive bias in social cognition relates to behaviour problems in middle school age.

In considering the mechanism by which positive mentalizing associates with behaviour problems, Baumeister et al. (1996, 1999) suggested that aggressive behaviour in people with OP self-concepts may be triggered by negative social feedback that challenges their positive self-views. In the same way, children may set themselves up for disappointment, which may in turn lead to aggression, when attributing inaccurate and OP mental states to their peers in situations of personal distress. Following Baumeister et al.'s argument further, an R mentalizing response style may be another example of an optimal range of bias which may protect against psychopathology. In this sense, it is important to consider a 'healthy' response category when developing social-cognitive tasks. Yet, much of this type of research has ignored neutral cognitions as some have suggested that neutral statements appear to be a type of 'cognitive noise' (Heimberg et al., 1990; Schwartz & Garamoni, 1986). In line with other recent studies (e.g., Clabour & Roger, 2004), we emphasize the importance of including a healthy response style in coding systems.

Although, as predicted, an OP mentalizing response style may pose a liability for externalizing problems, we could not confirm that an ON mentalizing response style was associated with symptoms of emotional disorder (as measured by the SDQ emotionality subscale). Although this appeared to be the case at the bivariate level of analyses, our multivariate analyses indicated that this effect disappeared when controlling for IQ and sex. Previous research on the attributional style in children of the same age range studied here suggested that a negative, stable and internal attributional style associates with depressive symptoms (Quiggle et al., 1992; Seligman, Peterson, Kaslow, Tanenbaum, Alloy & Abramson, 1984). Our findings suggest that in attributing mental states to others (regarding the self) this was not evident. This, in combination with our finding that 38 percent of children were classed as ON, suggests that it is quite possible that in this age group, making internal and stable negative attributions in the context of mentalizing is appropriate (e.g., that other children would think one is stupid if one fails a test). In this sense, children who adopt a negative mentalizing style are accurate in their mind-reading, which in turn may promote or maintain psychological health. The possibility that this may become a liability in adolescence cannot be addressed in the current study.

Our third aim was to investigate the change in mentalizing response style during a two-year follow-up period. The class membership variable did not show stability, which was probably due to the ON and OP response styles that showed clear fluidity in terms of stability, with low percentages of children remaining in these two classes. In contrast, almost 60 per cent of children classified as rational at baseline remained classified as such two years later upon retesting. Our results further suggest that children who tended towards a positive bias in their social information processing may switch to a negative bias with an increase in age. An interesting question that this poses is what the characteristics and outcomes are of the 22 percent of children who *remain* in the positive class at follow-up and on whom the observed age effect (to become more rational or negative with an increase in age) does not seem to exert an influence. This question requires further exploration.

Despite these strengths, this study has a number of limitations. Firstly, although the sample size is large compared with most work in social cognition, only limited steps were taken to investigate participation bias in this sample. And, despite no evidence of ascertainment bias, our sample cannot claim to be fully representative.

Secondly, from a theoretical perspective, it is not clear which social-cognitive abilities should be considered under the umbrella of mentalizing and how different aspects of social cognition relate to each other. Given the dearth of mentalizing tasks available in this age group, testing external/criterion validity remains a problem, especially for a task that seeks to measure biases in mentalizing. Nevertheless, other social-cognitive and personality measures could be included in further work to investigate convergent and divergent validity.

Thirdly, the relationship between biased mentalizing and behaviour problems outlined above might also operate the other way round. It is possible that behaviour difficulties *lead to* biased mentalizing. Peers may be reluctant to feed back information to aggressive children for fear of being retaliated against. As such, aggressive children may seldom have the opportunity to see themselves through their peers' eyes. Longitudinal work (David & Kistner, 2000) and intervention studies are needed to test these hypothesized causal relationships.

Finally, although the advantages of the use of social vignettes for this type of research have been duly acknowledged (Daleiden et al., 1996), they cannot be expected to capture the full reality of children's perceptual lives.

Despite these limitations, the current study is important in providing a novel measure (biased mentalizing) that employs latent class analyses to distinguish children according to three mentalizing response styles, which, as indicated here have implications for child psychosocial adjustment. We hereby introduce the concept of distorted mentalizing as an alternative to the deficit model of mentalizing associated with autism research.

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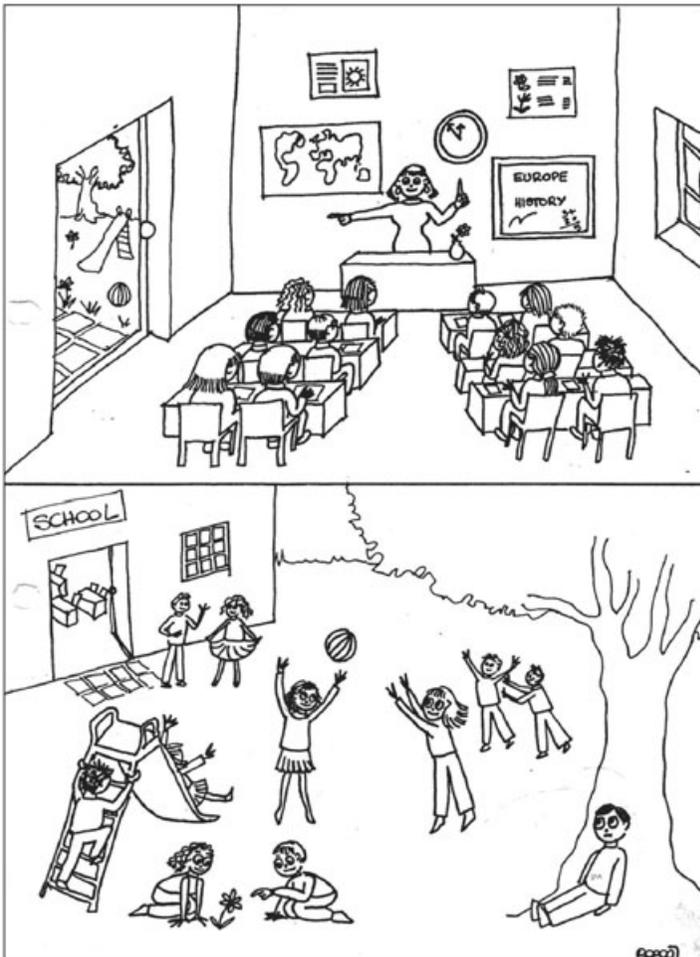
Appendix

Scenario 1 (boys' version)

One day Peter went to school and during break he went out to the playground. A lot of other kids went out to the playground too, but Peter was the only one sitting alone by the tree. Nobody was sitting or playing with him.

Imagine you are Peter. If you were, what do you think the other kids would be thinking about you?

- They would think nobody likes me
- They would think I'm just sitting down to have a think and a rest
- They would think I'm cool not to play silly games with the rest of the kids



Scenario 9 (girls' version)

Geena is the fattest girl in her class. She is much bigger than the rest of the boys and girls. One day, she left her gym shorts at home and had to borrow from someone else, but because she's so fat, she could not find big enough gym shorts to borrow.

Imagine you are Geena. If you were, what do you think the other kids would be thinking about you?

- a) They would think it was bad luck forgetting my shorts
- b) They would think I'm really fat and ugly
- c) They would think I'm really cool because I don't have to do gym

