

Social Information Processing and Emotional Understanding in Children with LD

Nirit Bauminger, Hany Schorr Edelsztein, and Janice Morash

Abstract

The present study aimed to comprehensively examine social cognition processes in children with and without learning disabilities (LD), focusing on social information processing (SIP) and complex emotional understanding capabilities such as understanding complex, mixed, and hidden emotions. Participants were 50 children with LD (age range 9.4–12.7; 35 boys, 15 girls) and 50 children without LD matched on grade, age, and gender. Children analyzed 4 social vignettes using Dodge's SIP model and completed 2 emotional recognition tasks (pictures and stories) and 4 emotional knowledge tasks, such as providing definitions and examples for 5 emotions (e.g., loneliness, pride, embarrassment). Study results demonstrated that children with LD had major difficulties in SIP processes and consistent difficulties with the different tasks in the understanding of complex emotions and in higher emotional understanding capabilities, such as understanding that 2 conflicting emotions (love and hate) can be simultaneously experienced. We discuss the implications of such difficulties for the understanding of social competence in children with LD as well as their implications for social skills intervention.

Although researchers continue to debate the status of social-emotional difficulties relative to cognitive-academic difficulties among children with learning disabilities (LD), a strong consensus exists regarding the centrality of social-emotional abilities to the characterization of the disorder (American Psychiatric Association, 1994). Kavale and Forness's (1996) meta-analysis provided support for this consensus by demonstrating social skills deficits in 75% of the children with LD.

Among the different domains included in children's social competence (e.g., social cognition, peer interaction, play), social cognition is the domain that most closely links cognitive and social-emotional capabilities. Social cognition includes the child's ability to spontaneously read and correctly interpret verbal and nonverbal social and emotional cues; the ability to recognize central and peripheral social and emotional information; the knowledge of different social behaviors and

their consequences in diverse social tasks (e.g., how to initiate a conversation, how to negotiate needs, how to make group entry); and the ability to make an adequate attribution about another person's mental state (i.e., "theory of mind" abilities or role-taking abilities; Crick & Dodge, 1994). As such, social cognition can be considered one of the most difficult areas for children with LD, linking their cognitive (e.g., attention, memory, reasoning, focusing, processing information; American Psychiatric Association, 1994) and social-emotional difficulties together (Turkaspas, 2002b).

A recent study (Lemerise & Arsenio, 2000) proposed a model of social cognition that fully integrates emotional processes (e.g., emotional recognition, knowledge, and regulation) into every stage of social information processing. For example, children who possess deficits in affective cue detection (in oneself or in others) or in accurately recognizing emotions within social contexts may find themselves

pursuing social goals that impede the successful continuation of social interaction. Researchers have conducted more work on the difficulties characterizing social information processing (SIP) among children with LD than on the emotional difficulties of these children (Arthur, 2003). Specifically, there is a paucity of literature regarding their difficulties in higher emotional understanding capabilities, such as the understanding of complex emotions (e.g., pride, guilt) or mixed or hidden emotions, which play an essential role in efficient peer interaction from middle childhood (Harris, 1989). Moreover, to the best of our knowledge, studies have yet to be conducted on the link between SIP and emotional understanding capabilities among children with LD. The present study aimed to fill this gap in the literature in order to provide a more comprehensive and integrative understanding of social-emotional difficulties in this population.

Dodge and his colleagues (Crick & Dodge, 1994; Dodge, 1986) proposed

a comprehensive SIP model to conceptualize the cognitive processes underlying social interactions in children. The six steps in this model consist of (a) encoding social cues (i.e., attending to appropriate cues, chunking and storing information); (b) mentally representing and interpreting the cues (i.e., integrating the cues with past experience and arriving at a meaningful understanding of them); (c) clarifying goals; (d) searching for possible social responses; (e) making a response decision after evaluating the consequences of the various responses and estimating the probability of favorable outcomes; and (f) acting out the selected response while monitoring its effects on the environment and regulating behavior accordingly.

Tur-Kaspa and Bryan (1994) found that children with LD performed less well on each of the steps of Dodge's (1986) model than their average-achieving classmates. Their study was unique in that it provided a comprehensive evaluation of the whole model with regard to children with LD. However, other researchers have demonstrated these children's difficulties in performing the different steps of Dodge's model. In encoding and mentally representing social cues, children with LD evidenced problems in focusing attention on significant cues, attending instead to extraneous irrelevant information (Parrill-Burnstein, 1981; Tur-Kaspa & Bryan, 1994). Children with LD exhibit difficulty in appropriately interpreting social situations, problematic comprehension of verbal and nonverbal social cues, and weak social perception processes (Bruno, 1981; Bryan, 1977; Markoski, 1983; Minskoff, 1980), and they sometimes find social codes to be meaningless and confusing (Schumaker & Hazel, 1984). Moreover, children with LD demonstrate lower competence levels than average-achieving children in taking others' perspectives and in understanding others' intentions (Weiss, 1984; Wong & Wong, 1980). When dealing with problem-solving processes (response search → evaluation → deci-

sion → enactment), they lack planning strategies and develop less sophisticated social goals (Olivia & LaGreca, 1988; Parrill-Burnstein, 1981), demonstrate less frequent and poorer quality social alternatives than average-achieving children (Carlson, 1987; Toro, Weissberg, Guare, & Liebenstein, 1990), do not use feedback to correct their mistakes, and have less ability to predict the consequences of social situations or the results of their own or others' actions (Bruno, 1981; Derr, 1986). Thus, difficulties in selecting responses are inevitable (Bryan, Werner, & Pearl, 1982).

Lemerise and Arsenio's (2000) model suggests that SIP requires emotional understanding capabilities (e.g., detecting nonverbal emotional cues). The interplay between social understanding and the understanding of emotion becomes specifically critical during middle childhood, when understanding of the more complex emotions (e.g., pride, embarrassment, guilt) grows significantly in typically developing children (Harris, 1989). In the present study, we examine the link between SIP in middle childhood and the age-equivalent emotional understanding capabilities—namely, understanding of complex emotions and higher emotional understanding capabilities, such as the understanding of mixed and hidden emotions.

The higher cognitive social-emotional capabilities, such as understanding complex emotions (e.g., pride) and labeling complex social situations as such, develop during middle childhood, much later than the ability to express these complex emotions (around 2 years of age) or the ability to understand simple emotions (happy, sad, angry, fearful) during the preschool years (Denham, 1998). Emotional understanding constitutes insight into one's emotional state as well as understanding of other people's feelings (Harris, 1989). Emotional understanding includes a variety of capabilities such as labeling emotional expressions; identifying emotional clues and emotion-eliciting situations; recogniz-

ing emotions within diverse social situations; using emotional language to describe one's own and others' emotional experiences; developing a knowledge of emotion-display rules; understanding the gap between an observed and a felt emotion; developing knowledge that multiple emotions can be felt simultaneously, even when these emotions conflict; and understanding the more complex social emotions, such as pride, guilt, and embarrassment (Denham, 1998). The present study examines such various emotional understanding capabilities, with a focus on complex emotions.

The understanding of complex emotions requires the consideration of an audience (e.g., in embarrassment and loneliness), the understanding of social norms (e.g., for pride and guilt), and the development of personal responsibility for the results of the situation (e.g., for pride; Lewis, 1993). Understanding of complex emotion is also based on the child's ability to pay attention to the social markers in the situation, which can rarely be detected solely on the basis of facial expressions. Thus, the understanding of complex emotion requires the understanding of the social context in which the expression is manifested (Lewis, 1993). The ability to take another person's perspective of oneself and one's behaviors, thoughts, and feelings is also essential to the understanding of complex emotions (Harris, 1989). For example, only if someone *saw* me slipping on a banana peel would I experience embarrassment; that is, taking the other's perspective of my behavior would provoke embarrassment.

Another higher emotional understanding capability that develops in mid-childhood is the understanding that individuals can simultaneously experience multiple and even mixed emotions toward the same situation or person. During this period, children's cognitive capabilities enable them to comprehend that opposite concepts (or emotions, such as sad and happy) may be directed concomitantly toward the same person or situation. For example,

children moving to a different neighborhood may feel sad to leave their friends yet excited to meet new friends (Harris, 1989).

By mid-childhood, children have already grasped the concept of privacy (Harris, 1989) and can understand that they may feel an emotion but not necessarily manifest it in their behavior. The understanding of the gap between an inner feeling and its external expression underlies the understanding of hidden emotions (Harris, 1989). Children in mid-childhood can already realize that concealing their inner feelings can protect them from getting hurt by others (e.g., when friends might tease them about their fears) or from hurting other people's feelings (e.g., when receiving an undesired gift from a beloved person). Based on this understanding, children can also comprehend the fact that other children can hide their feelings. The acknowledgment of this gap between manifested emotion and experienced emotion allows children to make inferences regarding others' emotional states during complex social interactions. Children need to take into consideration the social context and their former knowledge of and familiarity with the other children or adults involved in the situation in order to accurately conjecture about the others' emotional state. In line with this complexity, as children grow older, they need less concrete, external, physical clues to detect emotional states in the self and in others (e.g., I know he is happy because he is laughing). Instead, they can relate to more internal, psychological clues (e.g., I know that I am happy because I feel good inside; Greenberg, Kusche, Cook, & Quamma, 1995).

Thus, children's complex emotional behavior during mid-childhood requires attributions to the social context and to the people who are involved in the situation. Moreover, this emotional behavior involves higher social and cognitive capabilities than the earlier understanding of basic emotions. These abilities may pose difficulties for children with LD, who demon-

strate a mixture of social and cognitive difficulties when processing social-emotional information.

Research on emotional understanding in children with LD is limited in several ways. The majority of studies have implemented the *Profile of Nonverbal Sensitivity* (PONS; Rosenthal, Hall, DiMatteo, Royers, & Archer, 1979), which exposes the child to an adult expressing (through visual, auditory, or both modes) positive or negative affect during 20 emotional situations. However, the PONS requires the child to recognize not the emotions themselves but only the emotions' negative or positive tone (e.g., Axelrod, 1982; Creasey & Jarvis, 1987; De Paulo & Rosenthal, 1978; Reiff & Gerber, 1990; Sisterhen & Gerber, 1989). Other studies (Dimitrovsky, Spector, Levy-Shiff, & Vakil, 1998; Holder & Kirkpatrick, 1991) did ask the child to recognize and label the emotions using Ekman and Friesen's (1976) *Pictures of Facial Affect* procedure, which includes six basic emotions (happiness, fear, surprise, sadness, anger, and disgust). Most and Greenbank (2000) used the *Identification of Emotion Test* (IET) procedure, involving the same six emotions, examining recognition of emotions based on auditory, visual, or both modes. In general, the different studies reported that children with LD were less proficient in recognizing basic emotions via the different modes than children without LD. Some advantages emerged for the combined (visual and auditory) mode over the modes presented separately. Furthermore, Loveland, Fletcher, and Bailey (1990) found no group differences between children with mathematics disorder and children with reading disorder in their interpretation of affect from social stimuli; however, both of these LD groups evidenced more errors of misinterpreting affect than did children without LD.

However, all these studies examined the recognition of basic emotions (see also, e.g., Sprouse, Hall, Webster, & Bolen, 1998), with the exception of one study that included the recogni-

tion of embarrassment (Wiig & Harris, 1974). Researchers have not systematically addressed the more advanced emotional capabilities, such as the knowledge of complex emotions, that characterize typical development at this age.

Another aspect of emotional understanding that has not earned sufficient attention in the literature is children's ability to talk about their emotional states. This capacity includes describing one's emotional experience, telling about the cues that help one detect emotions in oneself and in others, and defining emotions. The present study strives to expand our understanding of the emotional knowledge of children with LD, specifically with regard to higher emotional capabilities such as the understanding of complex, mixed, and hidden emotions as well as the link between emotional knowledge and SIP capabilities. Thus, the present study has three aims:

1. to compare the SIP of children with LD (LD group) and children without LD (NLD group);
2. to compare the emotional understanding (recognition and knowledge) capabilities of children with and without LD; and
3. to examine the link between SIP and emotional understanding in each group.

Method

Participants

The study sample consisted of 100 children in fourth to sixth grade (age range = 9.4–12.7 years; for LD; $M = 133.92$ months, $SD = 12.86$; for NLD, $M = 132.28$, $SD = 11.05$) who attended two large elementary schools in central Israel. Both schools served students of middle SES and of similar racial backgrounds. The experimental group consisted of 50 students with LD (35 boys and 15 girls), including 18 fourth graders, 15 fifth graders, and 17 sixth graders. We matched a control (NLD) group of 50 average-achieving chil-

dren to the LD group on gender, age, grade, and class distribution. No significant statistical differences between the two groups appeared on any of these variables.

In line with the educational policy of the Israeli Ministry of Education, students with LD had been formally classified as having LD by the school district psychological services agency. The diagnostic assessment included instruments such as the Hebrew version of the *Wechsler Intelligence Scale for Children-Revised* (WISC-R; Wechsler, 1974), *Bender-Gestalt Test* (Koppitz, 1975), figure drawings (Koppitz, 1968), and achievement tests in one or more learning processes (i.e., reading, writing, mathematical calculation, or mathematical reasoning), as well as additional tests where necessary. Students were classified as having LD based on the criteria in Israel for LD classification, which include (a) achievement test scores at least 2 years below grade level and (b) average or above-average intelligence with a marked deficit in academic achievement. Exclusion criteria were (a) extreme behavioral or attentional difficulties that would impede completion of the study measures; (b) frank neurological problems; (c) sensory impairments; and (d) problems presumed to be due to environmental, economic, or cultural factors. In line with the Israeli law of special education, students with significant LD were assessed in their schools, diagnosed by the school district psychological services, and identified by an interdisciplinary placement committee as in need of remedial help or special education services. Children's IQ scores were not available to the research team, owing to Israeli regulations for privacy protection. However, by definition for an LD diagnosis, these IQ scores were in the average range (Ministry of Education, Culture, and Sports, 1996).

The NLD group consisted of average-achieving students from the same classes. For each of the 21 classes in fourth through sixth grade in the two schools (totaling 720 students), we asked

teachers to identify 7 boys and 3 girls who matched students with LD on age, who evidenced average grades, and who did not reveal any specific or consistent learning or behavioral problems. Of the 210 children (63 girls and 147 boys) who were recommended by teachers, 50 were randomly selected to compose the control group in the current study.

To validate the classification and matching process, we examined the mean achievement scores of the two groups on standard, school-administered examinations from the previous academic year in two subjects. A significant difference emerged between the children with and without LD on reading achievement scores (LD, $M = 75$, $SD = 8.66$; NLD, $M = 90.60$, $SD = 3.74$), $t(88) = 10.72$, $p < .001$, and on math achievement scores (LD, $M = 72.65$, $SD = 13.97$; NLD, $M = 92.68$, $SD = 3.72$), $t(88) = 9.48$, $p < .001$.

Assessment Measures

In line with the study objectives, we examined two main domains—social information processing (SIP) and emotional understanding, which in turn comprised emotional recognition and emotional knowledge.

Social Information Processing Skills Measure. In order to tap children's SIP, we used a modification of Tur-Kaspa and Bryan's (1994) social information processing (SIP) measure, which is based on Dodge's (1986) social information processing model. Tur-Kaspa and Bryan implemented five short social vignettes with the following contents: peer entry, provocation by a child, provocation with a child victim, sibling relationship, and teacher-student relationship. In line with our focus on the child's experience within the peer group, we excluded the vignette that focused on teacher-student relationships, and we changed the sibling vignette to a scenario between two friends (i.e., unintentionally damaging a friend's book). The examiner (either the second or third author) read each of the four vi-

gnettes aloud to the child individually and then, after each vignette, asked the child a series of questions that aimed to examine the child's steps of social information processing described in Crick and Dodge's (1994) model.

To exemplify the scoring procedure, we presented the peer entry vignette and its follow-up questions and scoring: "One free period Dan has nothing to do. He walks outside and sees two of his classmates playing a game. Dan really wants to play with them. He walks up to them, but they just keep on playing." The questions and scoring for the six steps were as follows:

Step 1. Encoding social cues. "Tell me everything you remember about the story." We coded children's responses along two dimensions: (a) core informational units and (b) embellishments. We summed all core informational units that each child provided for all four of the stories together, and we calculated the child's score as a percentage of the maximum 17 possible core information units. We also computed the number of embellishments provided (items not included in the scenario), with a score of one point for each bit of extraneous information.

Step 2. Representing/interpreting social cues. To measure representation of social cues, we asked, "What is the problem here?" We coded answers on a 3-point scale: 0 for incorrect identification of the problem, 1 for identification of the problem with no attribution or inclusion of social aspects (e.g., "Dan was bored" for the peer entry vignettes; "The tower got knocked over" for the provocation with the child as a victim), and 2 for a definition of the problem that related to its social aspects (e.g., "The kids ignored him" for the peer entry vignettes; "Guy destroyed Dan's tower and Dan was not happy" for the provocation with the child as a victim). Next, to measure interpretation of social cues, we asked, "Why do you think the two classmates keep on playing without inviting Dan to join them?" We scored responses as either a negative, hostile interpretation

(0; e.g., "because everybody hates him") or a positive, nonhostile interpretation (1; e.g., "because they were busy with their game"). Furthermore, we scored whether the children's interpretation took into account the multiple contextual and situational aspects related to the scenario, with a score of 1 for referring to situational aspects and a score of 0 for lacking reference to situational aspects.

Step 3. Clarifying goals. "If you were in the same situation as Dan, what would you like to have happen?" We coded responses on the total number of goals the child provided for all the four stories together and on the content of the goals classified as positive (e.g., "that they will join him in their game") versus negative (e.g., "to destroy his tower") goals.

Step 4. Searching for possible social responses. "Tell me all the different ways you can think of that Dan could deal with this situation. . . . What else? . . . What else?" We scored the total number of solutions that the child generated (or 0 for none). Furthermore, we executed content analysis of children's solutions and calculated the frequency of children's responses in each of the following five categories: competent solutions (e.g., politely asking the kids if he could join them); aggressive solutions (e.g., grabbing the ball from the kids); passive-avoidant solutions (e.g., sitting and watching the kids playing); solutions involving a third person (e.g., asking the teacher to tell the kids to play with him); or other ineffective solutions.

Step 5. Making a response decision. "You've suggested several solutions to this problem. Let's pretend that you're in the same situation as Dan. Which of these solutions would you choose?" We coded children's responses as either a competent solution (score 1) or an incompetent solution (score 0). After the child made a decision, we examined how the child evaluated the following types of solutions: competent solutions, passive solutions, third-party intervention solutions, and incompetent solutions. We said to the

child, "Now, here is a list of other possible solutions to this problem. Listen carefully to each one of them, and tell me if you think it is a bad, fair, or good solution." We scored children's response evaluations on a scale from 0 to 2, with 2 as the highest endorsement.

Step 6. Enactment process. "One of the things you could do is to ask your classmates nicely to join their game. Let's pretend again that you're in the same situation as Dan. Could you show me how you would go about saying this to your classmates?" We excluded the enactment step from the analysis because all children in both groups provided an effective but artificial response.

Link between goals and selected solution. In line with more recent SIP models that suggest a circular rather than a linear model of processing social information (Crick & Dodge, 1994), we decided to add a category that measured the extent to which the goals that the child suggested at the beginning of the process corresponded to the child's selection of a solution to the problem. We scored children's responses along a 3-point scale as follows: solutions that contradicted the suggested goals (score 0); goals and solutions that neither corresponded to nor contradicted (score 1); and goals and selected solution that were clearly linked (score 2). Children obtained a full score if their chosen solution met at least one of their goals.

To calculate interrater agreement for the coding of the SIP steps, two raters independently coded the same randomly selected 40% of children's responses. Interrater agreement was 89% for encoding; 94% for representation/interpretation; 97% for clarification of goals; 95% for response search; 89% for response decision and response evaluation; and 85% for linkage between goals and solutions. All disagreements were discussed until the raters reached agreement.

Emotional Understanding Measures. The current study included two main dimensions of emotional under-

standing: recognition and knowledge. To examine emotional recognition, we used two main measures: recognition of emotions from stories and from pictures. Examination of emotional knowledge relied on the *Kusche Affective Interview*.

Emotional recognition from stories. The *Emotion Comprehension Task* (Cermelo, Ackerman, & Izard, 1995) included 18 different short stories that described six different emotions: sadness, happiness, anger, fear, shame, and interest. After reading the story to the child, the examiner asked him or her, "How does the boy/girl in the story feel?" The original study included children at preschool ages and focused mainly on basic emotions. In line with our aim to test complex emotions of older Israeli children, we adapted the stories. Our adaptation retained 2 original stories on happiness and developed 2 new stories for each of the following four emotions, for a total of 10 stories: embarrassment, loneliness, pride, and guilt. For example, the following story was used for embarrassment: "The teacher asked her class a question. All the children raised their hands to answer, and only Danny did not know the answer. All the children stared at Danny."

As in the original version, after reading the story to the child, the examiner asked the child (a) to respond to the question, "How does the boy/girl in the story feel?" by selecting the accurate emotion from a written list of the five target emotions, and (b) to explain his or her answer. We asked children to explain why the emotion they chose was appropriate to the story, in order to examine if children understood the social context in which each emotion was presented. We coded children's answers along two dimensions: (a) emotional recognition and (b) relevance of explanation. We coded emotional recognition on a 3-point scale as follows: incorrect identification of the emotion, such as naming happiness instead of embarrassment (score 0); partial recognition of the emotion (i.e., wrong emotion, but with the same

hedonic tone, such as substituting happiness for pride; score 1); or complete recognition (score 2). We also scored explanations as relevant (score 1) or irrelevant (score 0).

Prior to this study, we conducted a pilot study for the modified measure on 25 children with typical development, who represented 25% of the subsequent NLD sample. The study indicated that 85% to 100% of the children accurately identified the target emotions.

Emotional recognition from pictures. The *Affective Matching Measure* (Feshbach, 1993) assessed children's ability to recognize emotions from their social context. Feshbach's original task exposed the child to 10 different pictures depicting social scenarios of six different emotions. Four were basic emotions (happiness, fear, anger, and sadness) and two were complex emotions (loneliness and pride). For example, a boy holding a report card with all scores marked "excellent" represented pride, and a child almost being hit by a car represented fear. Each picture presented one boy or girl without facial expression; therefore, the picture's social context provided the clues for children's identification of the appropriate emotion. After showing each picture, the examiner asked, "How does the boy/girl in the picture feel? ... Why?"

We modified Feshbach's (1993) measurement scale to include a broader repertoire of complex emotions. The modified measure included 12 pictures describing eight different emotions: 1 picture for each of the same four basic emotions used in the original measure, and 2 pictures for each of the following four complex emotions: loneliness, pride, embarrassment, and guilt. For example, to tap embarrassment, we added a picture depicting a boy losing a race while his friends laughed at him. We coded children's answers according to (a) accuracy of identification of the emotion and (b) relevance of the explanation, similar to the coding for recognition of emotions from stories. We piloted the modified measurement on 25 children with typical develop-

ment matched by age to the children in the current study. The study indicated that 85% to 100% of the children accurately identified the target emotions.

Emotional knowledge. The *Kusche Affective Interview* (KAI-R; Kusche, Greenberg, & Beilke, 1988) assessed children's emotional knowledge at both an experiential and a metacognitive level with regard to the following five emotions: happiness, loneliness, embarrassment, pride, and guilt. We present the KAI-R's procedure for tapping the four key dimensions of emotional knowledge and our coding procedure derived from Carroll and Steward (1984) and from Greenberg et al. (1995):

1. *Emotional vocabulary.* We asked children to provide definitions for the five emotions and coded their definitions as correct or incorrect.

2. *Experience of emotions.* We asked children to tell about a time they felt each of the five emotions. We coded children's responses as correct or incorrect examples of the emotions.

3. *Clues to recognizing emotions in oneself and in others.* We asked children, "How do you know when you are feeling ____ (e.g., happy)?" and "How do you know when other people are feeling ____ (e.g., happy)?" We coded children's responses into the following four categories: (a) bodily signs (smile, facial expression); (b) situational signs (e.g., for loneliness, "when he sits alone and no one pays attention to him"); (c) internal signs (e.g., for happy, "when I feel good inside"); and (d) verbal signs (e.g., for pride, "he is happy and he tells everyone so").

4. *Mixed emotions.* For issues regarding the simultaneity of emotions, three pairs of feelings were probed. Children were asked, "Can someone feel ____ and ____ at the same time?" (e.g., sad/mad, happy/sad, love/anger). If the children responded that yes, it was possible, they were asked to provide an example of a time they felt both feelings at the same time. Children's answers were coded on a scale of 1 to 5 as follows: claiming that it was not possible to feel two emotions at the same time (score 1); claiming that it was possible to feel two emotions, but

as a sequential process (e.g., "mad when he broke my watch, then happy he got in trouble"; score 2); claiming it was possible to have two feelings simultaneously, but that the feelings were directed toward separate targets (e.g., "sad I can't go to the game and mad at my mom"; score 3); claiming it was possible to feel two different emotions during a single event, but without indicating definitively that the emotions were directed toward the same person or object (score 4); and claiming it was possible to feel two different emotions in a single event, with the emotions directed toward the same target (e.g., "I was happy that my picture looked so good, but sad it was not perfect"; score 5).

5. *Hiding emotions.* We asked children whether it was possible to hide emotions ("Can you or others hide their feelings?") and scored an answer of *yes* as 1 and of *no* as 0. We also asked those children who responded affirmatively to explain, "How can you hide your feelings?" We coded their responses as 1 if the child described keeping emotions to him- or herself and as 2 if the child's answer indicated an awareness of the fact that inner emotions can differ from their behavioral manifestation.

To calculate interrater agreement for the coding of the emotional understanding measures, two raters independently coded the same randomly selected 40% of children's responses. Interrater agreement was 97% for recognition from stories and 89% for recognition from pictures. For the KAI-R, interrater agreement was 91% for emotions' definition; 95% for experienced examples; 91% for clues to emotions, both in oneself and in others; 88% for mixed emotions; and 90% for hidden emotions. Raters discussed all disagreements until reaching consensus.

Procedure

The examiner conducted the study in a quiet room in children's schools, over two individual meetings with each child that lasted between 30 and 40 minutes each. Children completed the SIP mea-

sure during the first meeting and the emotional understanding measures during the second meeting. The emotional understanding measures were counterbalanced to prevent order effects, such that half the participants completed emotional recognition first and knowledge second and the other half completed them in reversed sequence. Also, for the emotional recognition measures, half of the participants completed the picture task before the story task, and the other half completed them in reversed sequence.

Results

Social Information Processing

In order to examine differences between children with LD and children without LD (NLD group), we performed a 2×2

(Group \times Gender) multivariate analysis of variance (MANOVA) according to Wilks' criterion, followed by univariate analysis of variance (ANOVA) or a 2×2 ANOVA for each of the following SIP components: (a) encoding; (b) representation/interpretation; (c) clarification of goals; (d) response search; (e) response decision and response evaluation; and (f) the concurrency between goals and chosen solution. Inasmuch as our focus was on group differences, and none of the interactions of gender and group were significant for any of the SIP components, we report group differences in detail and include description of gender and interaction effects only with regard to the results of the MANOVA. In two stages (encoding and response evaluation), gender effects were significant; thus, we also report the related significant ANOVAs.

Encoding. A 2 (Group) \times 2 (Gender) MANOVA yielded a significant effect of group, $F(2, 95) = 8.38, p < .001, \eta^2 = .15$, in encoding social cues. As can be seen from Table 1, only the follow-up ANOVA for recall of core information units was significant, indicating that children with LD were likely to recall fewer core informational units from the social vignettes. The follow-up ANOVA for embellishments only showed a tendency toward significance ($p = .08$), suggesting that children with LD tended to provide more extraneous irrelevant information units that had not been included in the stimuli than NLD children. The MANOVA for main effect of gender was also significant, $F(2, 95) = 3.84, p < .05, \eta^2 = .07$. Follow-up ANOVAs revealed a significant gender difference only for core information units, $F(1, 96) = 5.51, p < .05, \eta^2 = .05$ (girls, $M = 77.64, SD =$

TABLE 1
Group Differences Between Children With and Without LD (NLD) for Social Information Processing Components

Component	LD		NLD		F(1, 98)	η^2
	M	SD	M	SD		
Encoding						
Information units	67.05	13.80	79.17	11.89	22.10*	.18
Embellishment	2.22	1.45	1.63	1.58	3.04****	.03
Interpretation						
Problem identification	6.68	1.12	6.88	.83	0.80	.00
Content interpretation	2.31	1.22	2.48	1.07	0.51	.00
Context attribution	2.32	1.08	2.84	0.99	4.93***	.05
Goal clarification						
Positive goals	2.96	1.24	3.26	1.62	1.07	.01
Negative goals	1.14	1.03	1.54	1.31	2.87	.02
No. of goals	4.20	0.88	4.76	1.04	12.48*	.11
Response search						
No. of solutions	8.70	2.38	12.38	2.35	60.51*	.38
Competent	4.98	1.85	6.24	1.65	12.96**	.11
Aggressive	0.34	0.74	0.96	1.43	7.41***	.07
Passive-avoidant	1.56	1.47	2.66	2.03	9.58***	.08
Third person	0.88	1.27	1.00	1.10	0.25	.00
Other ineffective	0.94	1.10	1.52	1.22	6.28***	.06
Response decision						
Competency of solutions	3.12	0.98	3.74	0.49	16.00*	.14
Goal-solution concurrency						
Concurrency	4.70	1.78	6.06	1.67	15.56*	.13

Note. Eta-squared (η^2) which is a proportion of the variance explained, was employed as a measure of the effect size (.01 = small, .06 = medium, and .14 = large). Several SDs were higher than their means; therefore, we performed an additional Mann-Whitney nonparametric test for independent samples for these cases, and the same significant differences emerged.

* $p < .001$. ** $p < .01$. *** $p < .05$. **** $p < .08$.

11.67; boys, $M = 71.17$, $SD = 12.80$). In both groups, girls recalled more core informational units from the social vignettes than did boys. The MANOVA for interaction effect (Group \times Gender) was nonsignificant, $F(2, 95) = .51$, $p > .05$, $\eta^2 = .01$.

Representation/Interpretation.

The MANOVAs for group, $F(3, 94) = 1.94$, $p > .05$, $\eta^2 = .06$; gender, $F(3, 94) = 1.22$, $p > .05$, $\eta^2 = .03$; and interaction effect, $F(3, 94) = .08$, $p > .05$, $\eta^2 = .003$, were nonsignificant with regard to the interpretation of social cues. Despite the nonsignificant overall effect for group, we followed up with a series of ANOVAs because we had an interest in group differences also with regard to each of the separate components of the interpretation stage. Indeed, a significant group difference emerged only with regard to the extent to which children's interpretations took into account the multiple contextual and situational aspects related to the social scenario. NLD group children's interpretations considered the vignette's social context to a greater degree than did the interpretations of their peers with LD (see Table 1).

Clarification of Goals. Children's responses on the clarification of goals were coded along two dimensions: the goals' quality (positive or negative goals) and their quantity (the total number of goals the child provided for all four stories). Thus, we conducted a 2×2 MANOVA on the positive or negative content of children's goals and a 2×2 ANOVA on the total number of goals that children suggested for solving the vignettes' social problems. The MANOVA revealed a significant group effect, $F(2, 95) = 3.27$, $p < .05$, $\eta^2 = .06$, but nonsignificant gender, $F(2, 95) = .94$, $p > .05$, $\eta^2 = .01$, and interaction effects, $F(2, 95) = 2.32$, $p > .05$, $\eta^2 = .04$. Follow-up ANOVAs were not significant for either positive or negative goals (see Table 1). The 2×2 ANOVA for the total number of goals revealed only a significant group effect, with children with LD providing fewer

goals than the NLD group children (see Table 1).

Response Search. The 2×2 ANOVA examining the total number of solutions that the children generated revealed only a significant group effect. Children with LD suggested fewer solutions than children without LD (see Table 1). Next, we conducted a MANOVA on the five different content types of solutions (competent, aggressive, passive-avoidant, involving a third person, or other ineffective). Only the MANOVA for group effect was significant, $F(5, 92) = 9.03$, $p < .001$, $\eta^2 = .33$. Gender, $F(5, 92) = 1.88$, $p > .05$, $\eta^2 = .09$, and interaction, $F(5, 92) = 1.01$, $p > .05$, $\eta^2 = .05$, effects were nonsignificant. Follow-up ANOVAs revealed significant group differences for all categories except solutions involving a third person (see Table 1).

Response Decision and Response Evaluation. To examine the competency level of children's chosen solutions, we computed a 2×2 ANOVA, which revealed a significant group difference and nonsignificant gender and interaction effects (see Table 1). Children with LD selected less competent solutions than NLD group children.

To examine the children's ability to evaluate given solutions (efficient, passive, third-person, and inefficient solutions), we computed a 2×2 MANOVA that yielded a significant gender effect, $F(4, 93) = 2.51$, $p < .05$, $\eta^2 = .09$, but nonsignificant group, $F(4, 93) = 1.26$, $p > .05$, $\eta^2 = .05$, and interaction, $F(4, 93) = .66$, $p > .05$, $\eta^2 = .02$, effects. Follow-up ANOVAs revealed a significant gender difference with regard to third-person solutions, $F(1, 96) = 7.83$, $p < .01$, $\eta^2 = .07$. Girls in both samples evaluated this option as a less positive solution than boys.

Goal-Solution Concurrency. We conducted a 2×2 ANOVA on the concurrency between children's social goals and their chosen solution. A significant group effect emerged (see Table 1), in which children with LD re-

vealed a lower consistency between their stated goals and their chosen solution than NLD group children. Neither gender nor interaction effects were significant.

Summary. As a group, children with LD revealed lower SIP capabilities than NLD group children—specifically, poorer encoding skills, less inclusion of the social context in their representation of social cues, a lower quantity of social goals, a lower quantity of solutions generated during their response search, a lower competence level of the solution chosen in the response decision step, and a weaker link between goals and the chosen solution.

Emotional Recognition

Group Differences on Stories and Pictures. We performed 2 (Group) $\times 2$ (Gender) MANOVAs on the global scores for emotional recognition from stories and from pictures. Main effect for group was found to be significant, $F(2, 95) = 59.47$, $p < .001$, $\eta^2 = .55$. Follow-up ANOVAs revealed that in both cases (recognition from stories and from pictures), children with LD demonstrated lower performance than children without LD (see Table 2). Neither gender, $F(2, 95) = 1.08$, $p > .05$, $\eta^2 = .02$, nor interaction effect, $F(2, 95) = 1.20$, $p > .05$, $\eta^2 = .02$, emerged as significant.

We were also interested in the child's recognition of the separate emotions in both the story and picture conditions; therefore, we computed chi-square analyses for each of the emotions in both conditions (see Tables 3 and 4). Based on the nonsignificant gender effect in the MANOVA results, we computed the chi-square for both genders together in each group (LD/NLD).

Table 3 presents the results for the separate chi-square analyses for correct recognition from stories of each emotion (happiness, embarrassment, loneliness, pride, and guilt). As can be

TABLE 2
Group Differences Between Children With and Without LD (NLD) for Emotional Understanding Components

Component	LD		NLD		F(1, 98)	η^2
	M	SD	M	SD		
Emotional recognition						
Stories	5.16	2.04	8.90	1.13	123.61*	.55
Pictures	17.56	2.28	21.80	1.44	128.24*	.56
Emotional knowledge						
Definition	1.62	0.94	3.98	1.00	147.10*	.60
Example	2.28	1.13	3.74	0.60	65.53*	.40
Mixed emotions						
Sad-angry	3.60	1.76	4.14	1.01	3.53	.03
Happy-sad	1.84	1.30	3.06	1.49	19.03*	.16
Love-anger	2.76	1.80	4.20	1.24	21.60*	.18

Note. Eta-squared (η^2), which is a proportion of the variance explained, was employed as a measure of the effect size (.01 = *small*, .06 = *medium*, and .14 = *large*). Several SDs were higher than their means; therefore, we performed an additional Mann-Whitney nonparametric test for independent samples for these cases, and the same significant differences emerged.

* $p < .001$.

seen from Table 3, for all of the emotions except happiness, children with LD performed lower than NLD group children. Children in both groups provided relevant explanations for each chosen emotion (100% in the NLD group and 98% in the LD group).

Table 4 presents the results for the separate chi-square analyses for correct recognition from pictures of each emotion (happiness, sadness, anger, fear, loneliness, embarrassment, pride, and guilt). As seen from Table 4, for all of the emotions except happiness and sadness, children with LD performed lower than NLD group children. The clearest group difference emerged for pride, followed by embarrassment and loneliness. With regard to children's explanations for their choice of emotion, in contrast to recognition from stories, irrelevant explanations for the emotions identified in the pictures were sufficiently common to justify chi-square analysis. These analyses revealed significant group differences with regard to the relevancy of explanation for the following emotions: fear, $\chi^2(2, N = 100) = 5.26, p < .05$ (90% of LD, 100% of NLD); loneliness, $\chi^2(2, N = 100) = 5.26, p < .05$ (90% of LD, 100% of NLD); embarrassment, $\chi^2(2, N = 100) = 13.28, p < .001$ (68% of LD, 96% of

TABLE 3
Distribution of Children Who Correctly Identified Various Emotions From Stories

Emotion	LD ^a		NLD ^a		$\chi^2(1, N = 100)$
	n	%	n	%	
Happiness	45	90	47	94	.54
Embarrassment	18	36	46	92	34.37*
Loneliness	4	8	29	58	36.18*
Pride	12	24	43	86	41.35*
Guilt	14	28	35	70	27.27*

Note. LD = children with learning disabilities; NLD = children without learning disabilities.

^an = 50.

* $p < .001$.

NLD); and guilt, $\chi^2(2, N = 100) = 12.00, p < .001$ (60% of LD, 90% of NLD). Children with LD provided fewer relevant explanations than their NLD group peers for identifying fear, loneliness, embarrassment, and guilt in the pictures.

Differences Between Pictures and Stories. We conducted a 2×2 ANOVA (Group \times Pictures/Stories) to examine group differences in recognition levels between emotions recognized from stories and emotions recognized from pictures. The ANOVA revealed a significant difference be-

tween stories and pictures, $F(1, 98) = 7.38, p < .01$, but no significant interaction between the groups and the story-picture discrepancy, $F(1, 98) = 2.93, p > .05$. In general, for both groups as a whole, percentages of recognition from stories ($M = 37.56, SD = 8.69$) were higher than percentages of recognition from pictures ($M = 35.88, SD = 8.22$).

Emotional Knowledge

Group Differences on Definition and Personal Examples. A 2 (Group) \times 2 (Gender) MANOVA on the

TABLE 4
Distribution of Children Who Correctly Identified Various Emotions From Pictures

Emotion	LD ^a		NLD ^a		$\chi^2(1, N = 100)$
	<i>n</i>	%	<i>n</i>	%	
Happiness	45	90	49	98	2.84
Sadness	27	54	31	62	.66
Anger	33	66	46	92	10.19**
Fear	36	72	44	88	4.00*
Loneliness	23	46	42	84	15.87***
Embarrassment	7	14	28	56	19.38***
Pride	7	14	40	80	43.72***
Guilt	6	12	21	42	11.42***

Note. LD = children with learning disabilities; NLD = children without learning disabilities.

^a*n* = 50.

p* < .05. *p* < .01. ****p* < .001.

global scores for emotional knowledge (definition and example) yielded a significant group effect, $F(2, 95) = 75.27$, $p < .001$, $\eta^2 = .61$. Follow-up ANOVAs revealed that in both cases (definition and examples) children with LD demonstrated lower performance than children without LD (see Table 2). Neither gender, $F(2, 95) = .79$, $p > .05$, $\eta^2 = .01$, nor interaction, $F(2, 95) = .82$, $p > .05$, $\eta^2 = .01$, effects emerged as significant.

Based on the nonsignificant gender effects for definition and examples of emotions, we computed chi-square analyses for both genders together in each group. Chi-square analyses examining group differences in the ability to accurately define emotions revealed significantly higher performance among NLD group children compared to LD group children for all five emotions: happiness, $\chi^2(2, N = 100) = 32.04$, $p < .001$ (92% and 38%, respectively); loneliness, $\chi^2(2, N = 100) = 5.74$, $p < .05$ (92% and 74%, respectively); embarrassment, $\chi^2(2, N = 100) = 34.31$, $p < .001$ (72% and 14%, respectively); pride, $\chi^2(2, N = 100) = 33.76$, $p < .001$ (82% and 24%, respectively); and guilt, $\chi^2(2, N = 100) = 25.00$, $p < .001$ (60% and 12%, respectively).

With regard to the ability to provide personal examples for each emo-

tion, all of the children in both groups were able to provide correct examples of a time they experienced happiness; however, chi-square analyses revealed group differences for all four of the other emotions. Children without LD produced a higher number of correct examples than children with LD for loneliness, $\chi^2(2, N = 100) = 11.42$, $p < .001$ (92% and 64%, respectively); embarrassment, $\chi^2(2, N = 100) = 34.03$, $p < .001$ (92% and 36%, respectively); pride, $\chi^2(2, N = 100) = 20.48$, $p < .001$ (100% and 66%, respectively); and guilt, $\chi^2(2, N = 100) = 10.75$, $p < .001$ (90% and 62%, respectively).

Group Differences for Emotional Clues. We analyzed children's identification of clues for recognizing emotions in themselves using only three of the four categories—bodily signs, situational signs, and internal signs. We excluded verbal signs from analysis due to its low frequency. Table 5 presents the distribution into categories for discerning emotional clues in oneself. Chi-square analysis revealed that in comparison to the control group, children with LD were less likely to discern internal clues in themselves for all five emotions, as well as situational

clues in themselves for embarrassment, pride, and guilt.

For identifying clues about others' emotions, we included all four categories in the analyses. Table 6 presents the distribution into categories for discerning emotional clues in others. Similar to the findings for identification of clues about their own emotions, children with LD less often discerned internal clues in others than did their NLD group peers, but only for three emotions (embarrassment, pride, and guilt). The children with LD also exhibited more difficulty identifying embarrassment and loneliness in others based on situational clues.

Group Differences on Mixed Emotions. A 2×2 MANOVA to examine group differences in the understanding of mixed emotions found significant results for group, $F(3, 94) = 11.90$, $p < .001$, $\eta^2 = .27$. Follow-up ANOVAs revealed a similar level of understanding in the LD and NLD groups regarding mixed emotions having the same hedonic tone (sadness and anger). However, significant group differences emerged in children's estimation of whether people could possibly feel two conflicting emotions (happiness-sadness, love-anger) at the same time. Children with LD were less likely to understand that it is possible to feel two conflicting emotions simultaneously than NLD group children (see Table 2). Neither gender, $F(3, 94) = 1.99$, $p > .05$, $\eta^2 = .06$, nor interaction $F(3, 94) = 1.25$, $p > .05$, $\eta^2 = .03$, effects emerged as significant.

Group Differences on Hiding Emotions. Most of the children in both groups reported that it is possible to hide emotions (83% of NLD and 81% of LD), and the chi-square analysis yielded a nonsignificant result. On the other hand, children's explanations describing how they hide emotions demonstrated significant group differences, $\chi^2(2, N = 100) = 11.65$, $p < .001$. The responses of 54% of the NLD group children included an awareness

TABLE 5
Percentages of Children by Group Who Discerned Clues of Different Types Related to Their Own Emotions

Emotion	Bodily clues			Situational clues			Internal clues		
	LD	NLD	χ^2	LD	NLD	χ^2	LD	NLD	$\chi^2(1, N = 100)$
Happiness	24	42	<i>ns</i>	40	48	<i>ns</i>	36	66	9.00**
Loneliness	6	4	<i>ns</i>	62	76	<i>ns</i>	30	54	5.90*
Embarrassment	4	10	<i>ns</i>	28	60	10.40**	18	66	23.64***
Pride	6	8	<i>ns</i>	22	52	9.65**	30	76	21.24***
Guilt	4	6	<i>ns</i>	52	78	7.42**	28	60	10.40**

Note. LD = children with learning disabilities; NLD = children without learning disabilities.

* $p < .05$. ** $p < .01$. *** $p < .001$.

TABLE 6
Percentages of Children by Group Who Discerned Clues of Different Types Related to Emotions in Others

Emotion	Bodily clues			Situational clues			Internal clues			Verbal clues		
	LD	NLD	χ^2	LD	NLD	χ^2	LD	NLD	χ^2	LD	NLD	$\chi^2(1, N = 100)$
Happiness	76	90	<i>ns</i>	12	12	<i>ns</i>	18	22	<i>ns</i>	6	16	<i>ns</i>
Loneliness	20	28	<i>ns</i>	46	72	7.00**	32	46	<i>ns</i>	2	2	<i>ns</i>
Embarrassment	32	60	7.89**	16	42	8.20**	20	40	4.76*	6	4	<i>ns</i>
Pride	26	32	<i>ns</i>	18	34	<i>ns</i>	22	48	7.43**	18	44	7.90**
Guilt	24	46	5.32*	26	40	<i>ns</i>	20	40	4.76*	8	26	5.74*

Note. LD = children with learning disabilities; NLD = children without learning disabilities.

* $p < .05$. ** $p < .01$. *** $p < .001$.

of the fact that inner emotions can differ from their behavioral manifestation (Category 2), versus 40% of the children with LD. The majority of children with LD (60%) provided explanations stating that emotions can be hidden by keeping them to oneself (Category 1).

Correlation Between SIP and Emotional Understanding

We computed Pearson correlation coefficients in each group to test for associations between SIP (encoding of relevant information, definition of the problem, number of goals and number of solutions, response decision) and emotional understanding (recognition of emotions from stories and pictures; total score on definition of emotions, experience of emotions, and mixed con-

flicted emotions). In general, several significant correlations emerged, showing that higher social information processing capabilities corresponded with better emotional understanding capabilities for both groups.

In children with LD, recognition of emotions correlated positively with three of the SIP capabilities: encoding ($r = .36, p < .001$, for pictures, and $r = .27, p < .05$, for stories); number of solutions ($r = .35, p < .01$, for pictures, and $r = .47, p < .001$, for stories); and number of goals linked with recognition ($r = .24, p < .05$, for stories only). For NLD group children, recognition from pictures and stories correlated with the definition of the problem ($r = .26, p < .05$, for pictures, and $r = .36, p < .01$, for stories) and with the response decision ($r = .30, p < .05$, for pictures, and $r = .29,$

$p < .05$, for stories). Due to the different correlations in the two groups, we conducted a Z Fisher test, which demonstrated nonsignificant differences between the different correlations.

Fewer significant correlations emerged for the link between emotional knowledge and SIP in both groups. For children with LD, personal examples of emotions correlated positively with encoding, $r = .36, p < .01$, and with definition of the problem, $r = .24, p < .05$; also, the number of solutions correlated positively with defining emotions, $r = .27, p < .05$. For NLD group children, response decision correlated positively with defining emotions, $r = .29, p < .05$; moreover, understanding of mixed conflicted emotions correlated with both number of goals, $r = .29, p < .05$, and response decision,

$r = .29, p < .05$. The Z Fisher was significant only for the correlation between response decision and defining emotions ($r = .29$ for NLD, $r = -.18$ for LD, $Z = 2.33, p < .01$).

Discussion

This study examined two basic social cognitive capabilities in children with LD during middle childhood, namely, social information processing (SIP) and emotional understanding regarding the recognition and knowledge of emotions. In contrast to former studies, this study focused mainly on complex emotions in children with LD and on higher emotional understanding capabilities, such as the comprehension of mixed and hidden emotions, in which social context and perspective taking play a crucial role.

Our findings revealed an inconsistent profile of SIP among children with LD. On the one hand, these children encoded social cues less well than their NLD group peers; the LD group children recalled less information and tended to add more irrelevant information while processing social situations. On the other hand, their ability to identify the problem and to interpret the situation as positive or negative resembled that of the NLD group children, although the NLD group evidenced better attributions to the situation's social context. Furthermore, children with LD suggested fewer social solutions to problems than did their NLD group peers, but the majority of their solutions were competent, and they resembled the NLD group in evaluating the competency of solutions presented to them. Nevertheless, children with LD revealed a less appropriate response decision, elicited fewer social goals, and were less likely to link their elicited goals and response decision. On the whole, these results coincided with Tur-Kaspa and Bryan's (1994) findings but expanded their results to include additional steps in the SIP model. Particularly, in line with Crick and Dodge's (1994) circular (rather

than linear) model of information processing, this study included the goals step ("What would you like to see happen?") and examined the link between these goals and the selected solution. Children with LD underperformed children without LD on both of these steps.

Tur-Kaspa and Bryan (1994) suggested that children with LD exhibit a unique SIP deficit and that their difficulties in encoding and in response decision may be independent of their academic difficulties. Tur-Kaspa and Bryan's suggestion derived from the significant differences they found between children with LD and low-achieving children only with respect to these two information processing steps. It should be noted that the two groups studied by Tur-Kaspa and Bryan did not differ on expressive or receptive vocabulary skills, thus eliminating them as possible factors accounting for differences in encoding and response decision.

Researchers have suggested several explanations for the inconsistent performance on SIP among children with LD. Tur-Kaspa and Bryan (1994) proposed that these children demonstrate deficits in perceptual capabilities but more intact social understanding capabilities. Thus, they can evaluate the social responses as well as children without LD even if they cannot encode the situation correctly. Gresham (1986) related the gap between these children's correct evaluations of solutions and their incorrect choice of the best solution to a suggested discrepancy between their knowledge and performance (e.g., as one child said to the examiner, "Would you like me to tell you what should be done, or what I will actually do?"). Researchers have linked this performance-knowledge discrepancy to children's lack of self-regulation capabilities, which may cause a more impulsive rather than planned social response (Eisenberg et al., 1996; Margalit & Tur-Kaspa, 1998), and to the child's affective state (Bryan, Sullivan-Burstein, & Mathur, 1998). Bryan et al. (1998) demonstrated that various

affect states differentially influence children's SIP. For example, positive self-induced mood correlated with the generation of a higher number of responses. Thus, failure to select the best solution may stem from depressed or negative affect triggered by previous negative social experiences. It may be that children with LD need mediation in order to transform their adequate theoretical social knowledge into actual manifestations of social behavior.

However, we would also like to suggest deficits or inconsistencies in these children's capability for social understanding. In particular, we propose that children with LD may experience difficulty in understanding the links between the different phases of SIP—which may be based on a difficulty in understanding social scenarios as a series of continuous, mutually related steps that influence and are influenced by one other. This deficit may impede their ability to predict the consequences of one scenario based on past experience with other, similar scenarios. This possibility should be examined in future studies. Furthermore, the current outcomes pinpoint these children's difficulties in linking goals with decision making and in relating to social contextual cues. Children with LD revealed consistent difficulties in understanding or recognizing complex social emotions, such as embarrassment, pride, guilt, or loneliness, which rely heavily on the consideration of social context and of the perspectives of the individuals involved in the situation (Kasari, Chamberlain, & Bauminger, 2001). See, for example, a representative sample of children's examples of emotional definitions in Appendix A and examples of emotional experiences in Appendix B.

With regard to the simpler emotions—mainly happiness—this study for the most part yielded nonsignificant group differences. That is, children with LD could recognize happiness from pictures and stories, provide an example of a time they experienced happiness, recognize sadness from pictures, and acknowledge that sadness

and anger may be simultaneously experienced by the same person or in the same situation. Previous research has also shown that these children understand happiness (e.g., Dimitrovsky et al., 1998; Holder & Kirkpatrick, 1991). Happiness is an emotion that can be detected based solely on facial expression, and its understanding does not require consideration of social context (Lewis, 1993).

Our study's unique contribution lies in its demonstration of the lower abilities of children with LD to understand complex social emotions. Complex social emotions play a crucial role in children's peer interactions during middle childhood. For example, Parker and Gottman (1989) characterized peer relations during middle childhood as based on the child's learning of emotional display rules that eliminate embarrassment (e.g., acting "cool," gossiping with peers). Moreover, Deater-Deckard (2001) linked children's better understanding of peers' emotional perspectives with prosocial and less conflicted peer relationships at different ages. Peer rejection and low social acceptance is a consistent finding across studies and across different measures (e.g., peer assessment, teacher ratings) that differentiate between children with and without LD (e.g., Kavale & Forness, 1996; Tur-Kaspa, 2002a; Vaughn, Erlbaum, & Schumm, 1996). Furthermore, the rejected social status of children with LD is stable over time (Frederickson & Furnham, 2001). The difficulties of children with LD in the understanding of complex emotions may constitute one factor leading to these youngsters' incompetent peer interactions and low social status during middle childhood (Frederickson & Furnham, 2001; Nabuzoka & Smith, 1993).

On the other hand, the limited social experiences of children with LD due to peer rejection may restrict their understanding of complex emotions and of display rules for emotions. As far as we know, no study has examined the link between emotional understanding of complex emotions and different aspects of social functioning,

such as peer rejection, in children with LD. However, one study (Kravetz, Faust, Lipshitz, & Shalhav, 1999) investigated the link between interpersonal understanding (based on Selman's model of children's friendship relationships) and social adaptation (based on teacher ratings) among children with LD. Kravetz et al. were specifically interested in the extent to which interpersonal understanding mediates the differences in social adaptation between children with and without LD. Their results demonstrated that children with LD rated significantly lower on social adaptation and on interpersonal understanding than children without LD. When ratings of interpersonal understanding served as a covariant, between-group differences on social adaptation indeed declined, but they remained significant. Thus, Kravetz et al.'s study provided some support for the assumption that interpersonal understanding is important for social functioning in children with LD. Nevertheless, other variables likely also play a role in reducing this population's social functioning.

One variable contributing to deficits in social functioning may indeed be the limited capability of children with LD for emotional understanding, specifically of socially based emotions such as embarrassment, pride, guilt, or loneliness, whose understanding relates inherently to children's ability to make sense of their social experience (Lewis, 1993; Saarni, 1999). A large body of studies has documented the poor decoding and interpretation of social and emotional (verbal and non-verbal) cues by children with LD in social situations; their lower sophistication in the understanding of social goals; and their lower ability to determine the consequences of different social scenarios (see reviews by Kavale & Forness, 1996, and Tur-Kaspa, 2002b). However, most studies in these reviews examined children's understanding of basic emotions (mostly using the PONS), whereas these children's social-emotional cognition deficits may manifest themselves more powerfully with

reference to socially complex emotions. Attribution to verbal and non-verbal communication cues is more salient in the understanding of these socially based complex emotions (Kasari et al., 2001). Furthermore, in order to be able to discern possible gaps between concrete emotional expression and hidden inner feelings, the child needs to understand more complex, ambiguous communicative and social interactions, which poses an additional challenge to children with LD who continue to struggle even with making sense of the perceptible, concrete social world.

Whether perceptual deficits in the comprehension of complex emotions lead to peer rejection or whether peer rejection constrains the development of emotional understanding of complex emotions, such interplay between limited social experience and limited emotional understanding, especially during middle childhood, may seriously impede children's social functioning (Saarni, 1999).

We claim not that children with LD fail to experience complex social emotions but, rather, that these children exhibit difficulties in reflecting on their emotional experience. According to Saarni (1999), the ability to describe emotional experience requires the development of a network of concepts or scripts for representing children's own emotional responses in a multidimensional matrix of causes, goals, values, social relations, and beliefs about emotional management. Typically developing children of ages 6 to 8 possess well-defined scripts that reveal such a multidimensional matrix. In the case of children with LD, these scripts may be delayed or fail to develop normatively.

This speculation needs further examination in future studies; however, children with LD in the current study did reveal a less mature understanding of mixed and hidden emotions and did provide less mature clues for detecting emotion in the self and others. First, unlike children without LD, they did not acknowledge the gap between internal feeling and its manifested be-

havior. Second, they agreed that two emotions could be experienced simultaneously only if the emotions shared the same hedonic tone (e.g., both negative emotions—sadness and anger). Third, they provided significantly fewer internal clues (the most mature type of emotional clues) to detect emotions in the self. These findings may support a delay explanation of complex emotions and of higher emotional understanding abilities, calling for future comparative studies that include children with LD at different age periods, to furnish a developmental profile of these children's emotional understanding abilities. Jackson, Enright, and Murdock (1987) offered partial support for a developmental assumption. They measured social perception using the PONS and social intelligence scales that focused on the child's ability to understand the thoughts, feelings, and intentions of other people as expressed by nonverbal behavior, such as facial expression, hand gestures, and body posture. Jackson et al. were specifically interested in the examination of age differences in social perception between ages 11, 14, and 17. Their findings revealed significant age differences between the youngest and the oldest children in each group (LD and NLD), in favor of the 17-year-olds; however, social perception remained significantly stronger for the NLD group even at age 17. Thus, some improvement in the understanding of emotional cues may be expected for children with LD, but their deficit continues, so that they significantly lag behind typical development.

One other explanation of the difficulties experienced by children with LD in complex emotions involves their difficulties with taking another person's perspective (Dickstein & Warren, 1980). Socially complex emotions, such as embarrassment and pride, require the ability to perform high-order attributions—namely, to take others' perspectives on one's own behavior (Lewis, 1993) or, as Saarni (1999) defined it, the ability to reflect on the self through the acknowledgment of social standards

and the role of others. Children with LD demonstrate difficulties with this skill, which may lead to difficulties in understanding or recognizing complex emotions. The link between a deficit in role-taking abilities—or in the theory of mind based on higher order attribution—and the understanding of complex social emotions should be further examined in future studies.

In summary, the present study highlighted a major difficulty with the understanding of complex emotions in elementary school-age children with LD. Children's understanding of complex emotions correlates with their social information processing, peer interactions, and social status during this age period. Difficulties in the understanding of complex social emotions can provide one venue to explain the social difficulties and low social status of children with LD. However, only further empirical investigation will help resolve the dilemma of whether the lower outcomes of children with LD in understanding complex emotions found in this study reflect a developmental delay, emotional-cognitive difficulties (in understanding complex situations and ambiguous realities and in understanding others' perspectives), or a developmental outcome of these children's limited social experience due to peer rejection.

This study has two main implications—one for research and one for practice. Future research would do well to focus on the understanding of complex emotions during real social interactions with peers. This study drew mainly on interviews with children, whereas direct observation of children's emotional behavior during social interaction may enhance our knowledge about how these children's lack of understanding of complex emotions influences their peer relations. Furthermore, in light of the growing evidence for different subtypes within the LD population (e.g., verbal and nonverbal LD; extrovert and introvert; reading-arithmetic and arithmetic only), future studies should consider these subtypes when examining the

emotional understanding abilities of children with LD, using a more gender-homogenous sample. Practically speaking, the SIP difficulties and emotional understanding difficulties of children with LD imply the need for intervention models that incorporate training in social cognition processes (e.g., understanding of verbal and nonverbal cues), including social and emotional understanding. Also, such interventions should inherently target social contexts and role-taking abilities. The link between social information processing and emotional understanding found in this study underscored the importance of a comprehensive intervention model with a dual focus on these two abilities. Such a model should be developmentally oriented to the information processing and emotional abilities needed for peer interaction in the target age population and should consider subtypes in the LD population.

ABOUT THE AUTHORS

Nirit Bauminger, PhD, is the head of the Special Education Department at the School of Education at Bar Ilan University. Her current interests focus on social-emotional development of children with special needs and on the design of relevant interventions, specifically targeting children with autism spectrum disorders and children with learning disabilities. Hany Schorr Edelsztein, MA, is a doctoral student in the Department of Special Education at Bar Ilan University. She is interested in the link between cognitive and social-cognitive difficulties in children with LD. Janice Morash, MA, is a doctoral student in the department of Special Education at Bar Ilan University. She is interested in the social-emotional development of children with LD. Address: Nirit Bauminger, School of Education, Bar-Ilan University, Ramat-Gan, 52900, Israel; e-mail: bauminn@mail.biu.ac.il

AUTHORS' NOTE

We would like to express our appreciation to Dee B. Ankonina for her editorial contributions.

REFERENCES

- American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental*

- disorders (4th ed.). Washington, DC: Author.
- Arthur, A. R. (2003). The emotional lives of people with LD. *British Journal of Learning Disabilities, 31*, 25–30.
- Axelrod, L. (1982). Social perception in learning disabled adolescents. *Journal of Learning Disabilities, 15*, 610–613.
- Bruno, R. M. (1981). Interpretation of pictorial presented social situations by learning disabled and normal children. *Journal of Learning Disabilities, 14*, 350–352.
- Bryan, T. (1977). Learning disabled children's comprehension of non-verbal communication. *Journal of Learning Disabilities, 10*, 36–41.
- Bryan, T., Sullivan-Burstein, K., & Mathur, S. (1998). The influence of affect on social information processing. *Journal of Learning Disabilities, 31*, 418–426.
- Bryan, T., Werner, M., & Pearl, R. (1982). Learning disabled students' conformity responses to prosocial and antisocial situations. *Learning Disability Quarterly, 5*, 344–352.
- Carlson, C. I. (1987). Social interaction goals and strategies of children with LD. *Journal of Learning Disabilities, 20*, 306–311.
- Carroll, J. J., & Steward, M. S. (1984). The role of cognitive development in children's understanding of their own feelings. *Child Development, 55*, 1468–1492.
- Cermele, J. A., Ackerman, B. P., & Izard, C. E. (1995). *Children's emotion situation knowledge*. Unpublished manuscript, University of Delaware at Newark.
- Creasey, G. L., & Jarvis, P. A. (1987). Sensitivity to nonverbal communication among male learning disabled adolescents. *Perceptual and Motor Skills, 64*, 873–874.
- Crick, N. R., & Dodge, K. A. (1994). A review and reformulation of social-information-processing mechanisms in children's social adjustment. *Psychological Bulletin, 115*, 74–101.
- Deater-Deckard, K. (2001). Annotation: Recent research examining the role of peer relationships in the development of psychopathology. *Journal of Child Psychology and Psychiatry, 42*, 565–579.
- Denham, S. A. (1998). *Emotional development in young children: The Guilford series on social and emotional development*. New York: Guilford Press.
- De Paulo, B. M., & Rosenthal, R. (1978). Age changes in nonverbal decoding as a function of increasing amounts of information. *Journal of Experimental Child Psychology, 26*, 280–287.
- Derr, A. M. (1986). How learning disabled adolescent boys make moral judgment. *Journal of Learning Disabilities, 19*, 160–163.
- Dickstein, E. B., & Warren, D. R. (1980). Role-taking deficits in learning disabled children. *Journal of Learning Disabilities, 13*, 33–37.
- Dimitrovsky, L., Spector, H., Levy-Shiff, R., & Vakil, E. (1998). Interpretation of facial expressions of affect in children with LD with verbal and nonverbal deficits. *Journal of Learning Disabilities, 31*, 292–312.
- Dodge, K. A. (1986). A social-information processing model of social competence in children. In M. Perlmutter (Ed.), *Minnesota symposium in child psychology* (Vol. 18, pp. 77–125). Hillsdale, NJ: Erlbaum.
- Ekman, P., & Friesen, W. V. (1976). *Pictures of facial affect*. Palo Alto, CA: Consulting Psychologists Press.
- Eisenberg, N., Fabes, R. A., Guthrie, I. K., Murphy, B. C., Maszk, P., Holmgren, R., et al. (1996). The relations of regulation and emotionality to problem behavior in elementary school children. *Development and Psychopathology, 8*, 141–162.
- Feshbach, N. (1993). *The affective matching measure*. Unpublished manuscript, University of California at Los Angeles.
- Frederickson, N. L., & Furnham, A. F. (2001). The long-term stability of sociometric status classification: A longitudinal study of included pupils who have moderate learning difficulties and their mainstream peers. *Journal of Child Psychology and Psychiatry, 42*, 581–592.
- Greenberg, M. T., Kusche, C. A., Cook, E. T., & Quamma, J. P. (1995). Promoting emotional competence in school-aged children: The effects of the PATHS curriculum. *Development and Psychopathology, 7*, 117–136.
- Gresham, F. M. (1986). Conceptual and definition issues in the assessment of children's social skills: Implications for classification and training. *Journal of Clinical Child Psychology, 15*, 3–15.
- Harris, P. L. (1989). *Children and emotion: The development of psychological understanding*. Oxford, UK: Blackwell.
- Holder, H. B., & Kirkpatrick, S. W. (1991). Interpretation of emotion from facial expression in children with and without LD. *Journal of Learning Disabilities, 24*, 170–177.
- Jackson, S. C., Enright, R. D., & Murdock, J. Y. (1987). Social perception problems in learning disabled youth: Developmental lag versus perceptual deficit. *Journal of Learning Disabilities, 20*, 361–364.
- Kasari, C., Chamberlain, B., & Bauminger, N. (2001). Social emotions and social relationships in autism: Can children with autism compensate? In J. Burack, T. Charman, N. Yirmiya, & P. Zelazo (Eds.), *Development and autism: Perspectives from theory and research* (pp. 309–323). Hillsdale, NJ: Erlbaum.
- Kavale, K. A., & Forness, S. T. (1996). Social skills deficits and LD: A meta-analysis. *Journal of Learning Disabilities, 29*, 226–237.
- Koppitz, E. M. (1968). *Psychological evaluation of children's human figure drawings*. New York: Grune & Stratton.
- Koppitz, E. M. (1975). *The Bender-Gestalt test for young children*. New York: Grune & Stratton.
- Kravetz, S., Faust, M., Lipshitz, S., & Shalhav, S. (1999). LD, interpersonal understanding, and social behavior in the classroom. *Journal of Learning Disabilities, 32*, 248–255.
- Kusche, C. A., Greenberg, M. T., & Beilke, B. (1988). *The Kusche affective interview*. Unpublished manuscript, University of Washington–Seattle, Department of Psychology.
- Lemerise, E. A., & Arsenio, W. F. (2000). An integrated model of emotion processes and cognition in social information processing. *Child Development, 71*, 107–118.
- Lewis, M. (1993). The emergence of human emotions. In M. Lewis & J. M. Haviland (Eds.), *Handbook of emotions* (pp. 223–235). New York: Guilford Press.
- Loveland, K. A., Fletcher, J. M., & Bailey, V. (1990). Verbal and nonverbal communication of events in learning disability subtypes. *Journal of Clinical and Experimental Neuropsychology, 12*, 433–447.
- Margalit, M., & Tur-Kaspa, H. (1998). LD: A multi-dimensional neurodevelopment model. *Psychology, 7*, 64–76.
- Markoski, B. D. (1983). Conversational interactions of the learning disabled and nondisabled child. *Journal of Learning Disabilities, 16*, 606–609.
- Ministry of Education, Culture, and Sports. (1996). *Director general's directive: Special directive IV*. Jerusalem: Author. (Hebrew)
- Minskoff, E. H. (1980). Teaching approach for developing nonverbal communication skills in students with social perceptions deficits. *Journal of Learning Disabilities, 13*, 9–15.
- Most, T., & Greenbank, A. (2000). Auditory, visual, and auditory-visual perception of emotions by adolescents with and with-

- out LD, and their relationships to social skills. *Learning Disabilities Research & Practice*, 15, 171-178.
- Nabuzoka, D., & Smith, P. K. (1993). Sociometric status and social behaviour of children with and without learning difficulties. *Journal of Child Psychology and Psychiatry*, 34, 1435-1448.
- Olivia, A. H., & LaGreca, A. M. (1988). Children with LD: Social goals and strategies. *Journal of Learning Disabilities*, 21, 301-306.
- Parker, J. G., & Gottman, J. M. (1989). Social and emotional development in a relational context: Friendship interaction from early childhood to adolescence. In T. Brendt & G. Ladd (Eds.), *Peer relationships in child development* (pp. 95-131). New York: Wiley.
- Parrill-Burnstein, M. (1981). *Problem solving and LD: An information processing approach*. New York: Grune & Stratton.
- Reiff, H. B., & Gerber, P. J. (1990). Cognitive correlates of social perception in students with LD. *Journal of Learning Disabilities*, 23, 260-262.
- Rosenthal, R., Hall, J. A., DiMatteo, M. R., Royers, P. L., & Archer, D. (1979). *Sensitivity to nonverbal communication—The PONS test*. London: Johns Hopkins University Press.
- Saarni, C. (1999). *The development of emotional competence*. New York: Guilford Press.
- Schumaker, J. B., & Hazel, J. S. (1984). Social skills assessment and training for the learning disabled: Who's on first and what's on second? *Journal of Learning Disabilities*, 17, 422-429.
- Sisterhen, S. H., & Gerber, P. J. (1989). Auditory, visual, and multi-sensory nonverbal social perception in adolescents with and without LD. *Journal of Learning Disabilities*, 22, 245-249.
- Sprouse, C. A., Hall, C. W., Webster, R. F., & Bolen, L. M. (1998). Social perception in students with LD and attention deficit/hyperactivity disorder. *Journal of Nonverbal Behavior*, 22, 125-134.
- Toro, P. A., Weissberg, R. P., Guare, J., & Liebenstein, N. L. (1990). A comparison of children with and without LD on social problem-solving skills, school behavior, and family background. *Journal of Learning Disabilities*, 23, 115-120.
- Tur-Kaspa, H. (2002a). The socioemotional adjustment of adolescents with LD in the kibbutz during high school transition periods. *Journal of Learning Disabilities*, 35, 87-96.
- Tur-Kaspa, H. (2002b). Social cognition in LD. In B. Y. L. Wong & M. L. Donahue (Eds.), *The social dimensions of LD: Essays in honor of Tanis Bryan* (11-31). Hillsdale, NJ: Erlbaum.
- Tur-Kaspa, H., & Bryan, T. H. (1994). Social information processing skills of students with LD. *Learning Disabilities Research & Practice*, 9, 12-23.
- Vaughn, S., Erlbaum, E., & Schumm, J. S. (1996). The effects of inclusion on the social functioning of students with LD. *Journal of Learning Disabilities*, 29, 598-608.
- Wechsler, D. (1974). *Wechsler intelligence scale for children—Revised*. San Antonio, TX: Psychological Corp.
- Weiss, E. (1984). Learning disabled children's understanding of social interactions of peers. *Journal of Learning Disabilities*, 17, 612-615.
- Wiig, E. H., & Harris, S. P. (1974). Perception and interpretation of nonverbally expressed emotions by adolescents with LD. *Perceptual and Motor Skills*, 38, 239-245.
- Wong, B. Y. L., & Wong, R. (1980). Role-taking in normal achieving and learning disabled children. *Learning Disabilities Quarterly*, 3, 11-18.

APPENDIX A

Samples of Children's Definitions for Complex Social Emotions

Emotion	Children Without LD	Children With LD
Embarrassment	When someone is doing something unusual and everybody is laughing at him or her	When you do something and then you feel embarrassed
Pride	When you feel okay that you made someone feel good, or you succeeded in doing something, or you got something for something good	Someone who is not embarrassed about anything
Guilt	When you know that you did something wrong and you are guilty. It was your fault, you caused it	When you are being blamed for something that you did not do
Loneliness	When you are alone, there is nobody to support you, to do things with you, to help you, to learn your secrets, you feel alone in the world even if there are many people around	When you are alone

APPENDIX B
Children's Description of Their Experience of Complex Social Emotions

Emotion	Children Without LD	Children With LD
Embarrassment	On the soccer pitch, when the two teams were tied, and there was a chance to win, I did not succeed in kicking the ball into the goal, and we lost	Once when I had ear surgery, I felt embarrassed, I was scared stiff
Pride	I represented the class in a thinking competition, and I qualified to get into it, and I felt proud	Like when they bought me the watch
Guilt	We played tag, I tried to catch one boy, and by accident I pushed him and he fell, and I felt guilty for pushing him	When kids did something and they blamed me. My brother and I fought and they blamed me that I started it
Loneliness	When children from the class went out to a movie and they did not invite me	At home, when my sister did not let me play on the computer Loneliness