How does Sam feel?: Children’s labelling and drawing of basic emotions

Claire Brechet*, René Baldy and Delphine Picard
Développement Cognition Acquisition, Department of Psychology, University of Montpellier III, Montpellier, France

This study compares the ability of children aged from 6 to 11 to freely produce emotional labels based on detailed scenarios (labelling task), and their ability to depict basic emotions in their human figure drawing (subsequent drawing task). This comparison assesses the relevance of the use of a human figure drawing task in order to test children’s comprehension of basic emotions. Such a comparison has never been undertaken up to now, the two tasks being seen as belonging to relatively separate fields of investigation. Results indicate corresponding developmental patterns for both tasks and a clear-cut gap between simple emotions (happiness and sadness) and complex emotions (anger, fear, and disgust) in the ability to label and to depict basic emotions. These results suggest that a drawing task can be used to assess children’s understanding of basic emotions. Results are discussed according to the development of perceptual skills and the development of emotion conceptualization.

The development of the understanding of basic emotions (happiness, sadness, anger, surprise, fear, and disgust, Ekman, 1999; Ekman & Friesen, 1978) by the child has been examined by means of different tasks. These tasks have generally involved the identification of an emotion from photos of facial expressions, or from emotional scenarios featuring a character (see Gross & Ballif, 1991 for a literature review). Only recently have tasks requiring the drawings of faces or of whole human figures expressing basic emotions been used with children (e.g. Brechet, Picard, & Baldy, 2007; Cox, 2005). However, the relevance of these tasks as tools for the evaluation of the understanding of emotions has never been assessed directly. In this article, we assessed the relevance of a human figure drawing task for evaluating children’s understanding of basic emotions. To this end, we undertook a comparative analysis of the capacity for graphic depiction of basic emotions among children, and their capacity to label these emotions, starting from emotional scenarios.

It has been established that children refer to situations in order to understand emotions (Barden, Zelko, Duncan, & Masters, 1980; Harris, 1989; Saarni & Harris, 1989).

*Correspondence should be addressed to Claire Brechet, Department of Psychology, University of Montpellier III, Montpellier 34199, France (e-mail: claire.brechet@univ-montp3.fr; e-mail: brechetc laire@hotmail.com).

DOI:10.1348/026151008X345564
Various tasks have tested the understanding of emotions by means of stories or scenarios describing situations designed to evoke a target emotion in the character. Among these tasks, two in particular were noteworthy. The first required the matching of an emotional scenario with various stimuli: a photograph of a facial expression (Borke, 1971; Camras & Allison, 1985; Gosselin, 1995; Markham & Adams, 1992; Odom & Lemond, 1972); an emotional label (Camras & Allison, 1985; Gosselin, Roberge, & Lavallée, 1995; Reichenbach & Masters, 1983; Wiggers & van Lieshout, 1985); or another scenario (Brody & Harrison, 1987). A second type of task required the production, starting from an emotional scenario, of a facial expression (Odom & Lemond, 1972; Perron & Gosselin, 2004; Profyt & Whissell, 1991), or of an emotional label (Brody & Harrison, 1987; Widen & Russel, 2002, 2003; Wiggers & van Lieshout, 1985).

The production tasks, which turn out to be more complicated than the matching tasks, have been tested for different age groups and for various emotions, depending on studies. The results were fairly consistent; the differences observed from one study to another might be attributed to differences of methodology (Gross & Ballif, 1991). These studies demonstrated a progressive increase in correct responses with age: between the ages of 2 and 5 (Widen & Russell, 2003); the ages of 4 and 8 (Brody & Harrison, 1987; Profyt & Whissell, 1991; Wiggers & van Lieshout, 1985); and the ages of 5 and 10 (Odom & Lemond, 1972). Happiness was the emotion which generated the highest success level, followed by sadness (Brody & Harrison, 1987; Widen & Russell, 2003; Wiggers & van Lieshout, 1985). The results for anger and fear were intermediate, but varied according to the studies. Finally, a very low success level was generally observed for disgust and surprise (Widen & Russel, 2003; Wiggers & van Lieshout, 1985).

Experiments using emotional scenarios generally associated the scenario with other stimuli, for example a photograph of a face, a drawing, or an emotional label (Brody & Harrison, 1987; Camras & Allison, 1985; Gosselin, 1995; Markham & Adams, 1992; Widen & Russell, 2003; Wiggers & van Lieshout, 1985). These combinations were not always helpful in facilitating the task for the children. For example, Reichenbach and Masters (1983) showed that the use of two emotional stimuli – a scenario plus a photo – did not increase the success level in a task involving matching the stimulus with a label, when compared with the use of a single stimulus – a scenario or a photo. Furthermore, scenarios were often reused from one study to another (Camras & Allison, 1985; Camras, Grow, & Ribordy, 1983; Gosselin, 1995; Gosselin et al., 1995). They were generally short (e.g. for the emotion of happiness, ‘it’s a little boy’s birthday and he gets lots of presents’, Gosselin et al., 1995), and were subject to little experimental control, particularly in terms of the evocative power of the scenario. In the present study we used emotional scenarios independent of other stimuli. Furthermore, the scenarios were more detailed than the scenarios used up to now, and a precise control of the evocative power of the scenario was done according to the procedure described and used by Widen and Russell (2002). We used these emotional scenarios in order to measure children’s ability to label freely different basic emotions.

We selected the method of free labelling, which has been relatively little used in the literature in comparison with the forced choice response method. The method of free labelling, despite its apparent complexity, provided the best reflection of children’s spontaneous interpretation of an emotional stimulus (Fridlund, 1994; Russel, 1994; Widen & Russell, 2003). Widen and Russell (2003) have shown that when the stimuli were sufficiently well administered, the task of free labelling was understood at the age of 2–3 and the emotional labels were available in most cases at the age of 4–5. Wellman, Harris, Banerjee, and Sinclair (1995) have analysed the spontaneous use of emotional labels by
children aged from 2 to 4. They indicated that the labels used to express happiness are used from the age of 2, and that the labels used to express sadness, anger, fear, surprise, and disgust were produced from the age of 3 to 4. It appeared that the children applied these labels to themselves as well as to a third person (Bretherton & Beeghly, 1982; Wellman et al., 1995). However, it should be noted that the success level for a free labelling task varied according to the criteria used to judge the accuracy of the labels employed.

The main purpose of our study was to compare the ability of children aged from 6 to 11 to freely produce emotional labels based on scenarios, and their ability to depict basic emotions in their human figure drawing. Various studies have already examined children’s encoding of emotions in drawings of familiar objects (e.g. flower, tree, and bicycle) or in abstract art (Jolley, Fenn, & Jones, 2004; Jolley & Thomas, 1994, 1995). By contrast, the depiction of basic emotions in human figure drawing has only been the subject of recent research (Brechet et al., 2007; Cox, 2005; Golomb, 1992; Missaghi-Lakshman & Whissell, 1991; Picard, Brechet, & Baldy, 2007; Sayil, 2001). These studies involved either graphic completion tasks or drawing tasks. The completion tasks concerned only the facial expression of emotion, and required the child to complete the drawing of a pre-drawn face with the facial expression corresponding to the target emotion (Cox, 2005; Missaghi-Lakshman & Whissell, 1991; Sayil, 2001). In the drawing task, the child was free to depict the target emotion in the human figure drawing in any way he or she wanted, in response to a minimal verbal demand (e.g. for the emotion of happiness, ‘draw me a happy person’) (Brechet et al., 2007; Golomb, 1992; Picard et al., 2007).

The drawing tasks, the complexity of which turned out to be greater than that of completion tasks, indicated that the correct graphic depiction of emotions was weak at the age of 5. It increased between the ages of 5 and 8 for happiness and sadness, and between the ages of 8 and 11 for anger and surprise, though the success level never reached a ceiling (Brechet et al., 2007; Picard et al., 2007). In the completion task, the correct graphic depiction of emotions reached a ceiling at the age of 4–5 for happiness (Cox, 2005; Sayil, 2001) and at the age of 6–7 for sadness (Cox, 2005). The level of correct graphic depiction of anger, surprise, fear, and disgust was very low at the age of 4–5 (Cox, 2005). It rose with age for anger and surprise (Sayil, 2001), the later emotions being more well-depicted than fear and disgust (Cox, 2005; Missaghi-Lakshman & Whissell, 1991). To our knowledge, there were no data available for the depiction of fear and disgust in the drawing tasks.

Human figure drawing tasks involved the use of three possible types of graphic cues: facial expression; posture; and context (Brechet et al., 2007). The graphic cues of facial expression corresponded to facial features depicting emotion in the drawing (e.g. an upturned mouth for happiness). This was the most frequently studied category of cue, both in completion tasks (Cox, 2005; Missaghi-Lakshman & Whissell, 1991; Sayil, 2001) and in drawing tasks (Brechet et al., 2007; Golomb, 1992). Graphic cues of posture expressed emotion by certain positions of the limbs of the person in the drawing (e.g. arms flopping loosely to express sadness). Graphic cues of context referred to elements exterior to the person in the drawing (e.g. a present to express happiness). The use of cues of posture and context to represent emotion in a drawing appeared later (between the ages of 8 and 11) than cues of facial expression (between the ages of 5 and 8). However, the precise development of the use, alone or in combination, of these categories of cues with respect to age and emotion remains unknown.

Unlike the human figure drawing tasks which have been used in the literature (Brechet et al., 2007; Golomb, 1992; Picard et al., 2007), the drawing task which we
proposed to the child followed a labelling task based on emotional scenarios. Consequently, in our study, the child had the advantage of a more detailed context compared to the minimal verbal instructions which have been used up to now. As indicated by Brechet et al. (2007), children’s poor graphic ability to depict complex emotions like anger could be in part attributable to the minimal nature of the instructions given. According to these authors, ‘the use of detailed instructions illustrating each emotion by means of a story would probably induce better graphic performances from the children’ (Brecht et al., 2007, p. 152). Furthermore, preceding studies have tested only a limited number of emotions and age groups. The present study examined five basic emotions (happiness, sadness, anger, fear, and disgust) studying children from 6 to 11 years old.

The aim of our study was to test the relevance of the use of a human figure drawing task in order to test children’s comprehension of emotions. Labelling tasks are already known to be suited well to assess emotion understanding. By contrast, it is not clear to what extent drawing tasks are suitable to this purpose. Using a within-subject design, we compared the capacity of children to freely produce emotional labels from detailed scenarios (labelling task) with their capacity to depict emotions in a human figure drawing (subsequent drawing task). Such a comparison has never been undertaken up to now, the two tasks being seen as belonging to relatively separate fields of investigation. It was important to compare the two tasks together because they each involved a different processing of emotion in children, either verbal (labelling) or non-verbal (drawing). If the drawing task constitutes a relevant tool for the study of the comprehension of basic emotions among children, a small effect of the task factor should be observable on the number of correct responses recorded (labelling and drawing). We predicted that a gradual increase in the success level between the ages of 6 and 11 and sensitivity to emotion (in order of relative success: happiness; sadness; anger; fear; and disgust) should be observed for both tasks. In addition, tight relationships between the patterns of success/failure on the labelling task and the patterns of success/failure on the drawing task should emerge.

In the drawing task, we proceeded to an analysis of the correct drawings according to the categories of cues used to depict emotion (facial expression, posture, and context). The question which interested us was to understand how the child progressively combines these different categories of cues used to convey emotion according to age, and according to the emotion depicted in the drawing. Researchers have usually analysed expressive drawings by reference to a baseline drawing (e.g. Brechet et al., 2007; Burkitt, Barrett, & Davis, 2003a, 2003b; Burkitt & Newell, 2005). However, the human figure drawing was not systematically emotionally neutral: in some cases it displayed a happy face (see e.g. Picard et al., 2007). We chose here to ask the child to draw an emotionally neutral human figure drawing (i.e. of a character who ‘is thinking of nothing in particular’) as the baseline drawing. An analysis of the ability of children to produce a ‘neutral’ figure drawing was carried out. To our knowledge, no previous study has been concerned with the depiction of the absence of emotion in human figure drawing.

Method

Participants

One hundred and forty-four children were observed, divided into six age groups each consisting of 24 children: 6-year-olds ($M = 5$ years 6 months; $SD = 3$ months);
7-year-olds \((M = 6 \text{ years } 6 \text{ months}; \ SD = 4 \text{ months})\); 8-year-olds \((M = 7 \text{ years } 8 \text{ months}; \ SD = 4 \text{ months})\); 9-year-olds \((M = 8 \text{ years } 8 \text{ months}; \ SD = 3 \text{ months})\); 10-year-olds \((M = 9 \text{ years } 7 \text{ months}; \ SD = 4 \text{ months})\); and 11-year-olds \((M = 10 \text{ years } 7 \text{ months}; \ SD = 3 \text{ months})\). Each age group consisted of equal numbers of boys and girls. These children were attending kindergarten and primary schools in a town in the south of France; they were of average social-economic background, and in their normal school year. Twenty four university students (12 males and 12 females) \((M = 21 \text{ years } 4 \text{ months}; \ SD = 2 \text{ years})\) were also observed.

**Material**

The material consisted of an HB pencil and A4 sheets of blank paper. Six relatively detailed prototypical emotional scenarios (about 50 words), based on scenarios created by Widen and Russell (2002), were generated (see Appendix). They evoked, without naming them, the emotions of happiness, sadness, anger, fear, and disgust, plus a neutral emotional state, involving a character called Sam. All the basic emotions described by Ekman (Ekman, 1999; Ekman & Friesen, 1978) were illustrated, except surprise. Surprise was excluded from our study because of the low level of consensus observed among young children concerning situations eliciting this emotion (Phillips & Whissell, 1986). Following the example of Widen and Russell (2002), the evocative power of the scenarios was assessed. A pre-test was carried out among 28 adults who were asked to name the emotion evoked by each scenario. On average, 96% of the labels produced corresponded to the target label (happiness, sadness, anger, fear, and disgust). The other labels were synonyms.

**Procedure**

The participants were observed individually (approximately 20 minutes). The scenarios were read one by one by the experimenter, in 12 different pre-ordained orders. The experimenter adopted a tone and a facial expression as neutral as possible. For each of these scenarios, two tasks were presented to the participants in a fixed order: a labelling task; then a drawing task. The first task (labelling) provided a convenient background for the subsequent task (drawing), with scenarios offering a rich and detailed context for completing the graphic task. We did not counterbalance task presentation order so as to avoid the labels used in the drawing task influencing the production of the labels by the child. A within-subjects design was used in order to assess directly the relationships between labelling and drawing.

**Labelling task**

After the reading of the scenario, each participant was asked to freely label the emotion evoked except for the neutral scenario by means of the following instructions: ‘In your opinion, how does Sam feel?’ If questions were asked about the gender of the character, participants were told that they were free to decide whether Sam was a boy or a girl. Participants’ responses were noted. In order to ensure that participants intended to depict the target emotion in the subsequent drawing task, the experimenter gave feedback whenever the expected label was not produced. This occurred in 29% of the cases. More precisely, participants received feedback when they provided an erroneous label (corrective feedback, 7%), an indefinite response which included causes or consequences of emotion (rewording feedback, 20%), or no answer
The feedback consisted in the experimenter indicating the expected label, and making sure that participants agreed and understood it.

**Drawing task**
For each scenario, the drawing task was presented immediately after the labelling task. The experimenter provided the participant with a pencil and paper and invited him or her to draw Sam using the following instructions: ‘I would like you to draw Sam so that we can see how happy/sad/angry/frightened/disgusted he/she is’. When the neutral scenario was read, the instructions were: ‘I would like you to draw Sam’. The experimenter adjusted the instructions according to the gender attributed to Sam by the participant in the labelling task. This allowed the participants to attribute sexual identity freely to the person in the drawing, girls tending to draw females and boys tending to draw males (Baldy, 2002; Brechet, Picard, & Baldy, 2008). During the drawing task, the experimenter did not comment about the drawings. Participants mostly drew a whole human figure (95%). In the remaining cases, they (mostly adult drawers) produced only the face of Sam.

**Data analysis**

**Correct labelling**
Following the example of Widen and Russell (2002), three adult female judges decided jointly whether each label produced was correct (coded 1) or incorrect (coded 0). According to the judgemental criteria, the response was considered correct only if the label referred explicitly to the emotional state of the character. The correct labels observed in our study were as follows, with their percentages in brackets: for happiness; happy (70%), joyful (28%), delighted (1%), and overwhelmed (1%); for sadness, sad (95%), unhappy (4%), and distressed (1%); for anger, angry (60%), edgy (22%), cross (14%), furious (3%), and discontented (1%); for fear, fear (98%) and frightened (2%); and for disgust, disgusted (90%), sickened (5%), and yuk! (5%).

**Correct drawing**
Following the example of Cox (2005), three adult female judges who had been trained in the analysis of expressive pictures independently assigned an emotion to each drawing using a list consisting of six labels (happiness, sadness, anger, fear, disgust, and neutral) (forced choice situation). When at least two out of three agreed in the attribution of the same emotion to a drawing, the drawing was considered to be ‘expressive’ of the emotion in question. We coded 1 the expressive drawings corresponding to the target emotion (correct expressive drawings). We coded 0 the expressive drawings corresponding to another emotion than the target one (incorrect expressive drawings) and the drawings which led to an agreement between judges less than two out of three. The inter-judge agreement was 98% ($k$ coefficient for inter-rater reliability was .98, $p < .01$).

**Results**

**Correct labelling and correct depiction of emotions in the drawing**
Figure 1 presents the number of correct responses for each age group and for each task for the following emotions: happiness (A); sadness (B); anger (C); disgust (D); and
These data were subject to analysis of variance with age (7) and gender (2) as between-subject factors and task (2) and emotion (5) as within-subject factors. The data concerning the neutral drawing were analysed separately. Although it may seem unconventional to use parametric tests on binary data, it has been shown (e.g. Greer & Dunlap, 1997; Lunney, 1970) that analysis of variance can be used on binary data under certain conditions (e.g. the number of degrees of freedom of the error term must be above 40). These conditions were satisfied here. We have used an α level of .05 for all statistical tests. Note that the analysis of variance showed no significant differences by gender, or any interaction of this factor with any other factor.

Figure 1. Number of correct responses as a function of age group and task for the emotions of happiness (A), sadness (B), anger (C), disgust (D), and fear (E). The level of correct responses recorded in the labelling task is indicated by a curve marked by black diamonds, responses recorded in the drawing task by a curve marked by white squares.
Sensitivity to the task
Congruent with our hypothesis, a limited effect of the task factor on the correct responses (labelling and drawing) emerged, \( F(1, 154) = 40.39; MSE = 0.14, p < .001 \). The labelling task generated a higher success than the drawing task. However, as is shown in Figure 1, this difference was most marked for fear (cf. Figure 1E). For this emotion, the number of correct responses for the labelling task was far superior to the number of correct responses for the drawing task. A significant interaction effect was recorded between the task and the emotion: \( F(4, 616) = 14.66; MSE = 0.13; p < .001 \). A post hoc Tukey test on this interaction indicated that the task effect was significant only for fear (\( p < .001 \)). No significant task-related difference appeared for the other emotions. The interaction between task, age, and emotion factors was not significant.

Sensitivity to age and to emotion
We expected a gradual increase in the success level between 6 and 11 years of age, and a sensitivity to the emotion for both tasks (in the order of success: happiness; sadness; anger; fear; and disgust). The analysis of variance revealed a significant age effect: \( F(6, 154) = 16.15; MSE = 0.27; p < .001 \). A post hoc Tukey test for the age factor indicated a significant increase in correct responses between the ages of 6 and 8, then between the ages of 8 and 11. The statistical analysis also revealed a significant effect for emotion: \( F(4, 616) = 92.42; MSE = 0.17; p < .001 \). A post hoc Tukey test for the emotion factor indicated a significant difference between happiness and all the other emotions (\( p < .001 \)). As predicted, happiness was the emotion that led to the highest success. The number of correct responses did not differ significantly between the emotions of sadness and fear, but was higher than that obtained for the emotions of disgust and anger. The number of correct responses did not differ significantly between these later emotions. The results in Figure 1 showed a gradual increase in correct responses with age for all the emotions except happiness (cf. Figure 1A), for which the percentage of correct responses reached a ceiling at the age of 7. A significant interaction effect was recorded between age and emotion: \( F(24, 161) = 1.99; MSE = 0.17; p < .01 \). An analysis of the simple effects of age for each emotion indicated a marginally significant age effect for happiness (\( p = .06 \)). The effect of age was significant for sadness, anger, fear, and disgust (\( ps < .01 \) for all).

Correct depiction of neutrality
How did the ability of children to draw a human figure showing no emotion develop? We observed that the number of correct neutral drawings remained relatively stable between the ages of 6 and 9 (10/24 at 6, 7/24 at 7, and 8, 6/24 at 9), and then increased until adulthood (8/24 at 10, 12/24 at 11, 19/24 for adults). A Chi-square test (Siegel, 1956) applied to these data revealed a significant difference in the number of participants correctly drawing a neutral person between the ages of 6, 7, 8, and 9 (30/96) and those of 10, 11, and adults (39/72), \( \chi^2(1, N = 168) = 8.93, p < .01 \). No significant difference was apparent between the ages of 6 and 7. There was no observed difference between both genders.

Relationships between labelling and drawing
We examined whether participants’ success/failure on the labelling task was systematically related to their success/failure on the drawing task. Table 1 presents
the distribution of the participants following their success or failure at each task and for each emotion. The results from Table 1 show that, whatever the emotion, the number of consistent participants prevailed over that of inconsistent participants. Overall, 69% of drawers displayed consistency, that is to say they either succeeded or failed at both tasks. Among the consistent participants, success predominated over failure in all emotions, except anger and disgust. Among the inconsistent participants, success at only labelling prevailed over success at only drawing, regardless of emotion. Fisher exact probability tests (Siegel, 1956) indicated that the distribution observed for each emotion significantly differed from a distribution that could be expected by chance ($p < .05$).

### Table 1. Numerical distribution of the participants following their success or failure at each task (labelling and drawing) for each emotion

<table>
<thead>
<tr>
<th>Emotion</th>
<th>Success at both tasks</th>
<th>Failure at both tasks</th>
<th>Success at labelling only</th>
<th>Success at drawing only</th>
<th>$p &lt;$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Happiness</td>
<td>142</td>
<td>4</td>
<td>14</td>
<td>8</td>
<td>.05</td>
</tr>
<tr>
<td>Sadness</td>
<td>110</td>
<td>16</td>
<td>26</td>
<td>16</td>
<td>.01</td>
</tr>
<tr>
<td>Anger</td>
<td>40</td>
<td>73</td>
<td>31</td>
<td>23</td>
<td>.001</td>
</tr>
<tr>
<td>Fear</td>
<td>80</td>
<td>12</td>
<td>70</td>
<td>5</td>
<td>.05</td>
</tr>
<tr>
<td>Disgust</td>
<td>42</td>
<td>62</td>
<td>37</td>
<td>27</td>
<td>.01</td>
</tr>
</tbody>
</table>

Note. $p$ is the probability that the observed distribution differed from a distribution that could be expected by chance. The total number of children is 168 per emotion.

### Analysis of incorrect responses

We thought it was interesting to analyse the incorrect responses obtained for the labelling task and for the drawing task. Typical errors of confusion have been mentioned in the literature: in various tasks; young children tended to confuse anger with sadness (Felleman, Barden, Carlson, Rosenberg, & Masters, 1983; Reichenbach & Masters, 1983); and anger with disgust (Gosselin et al., 1995). Table 2 shows the numerical distribution of incorrect responses obtained for the labelling task (A) and the drawing task (B).

In the labelling task (cf. Table 2A), the incorrect responses concerned essentially the emotions of anger (96 incorrect labels), disgust (89 incorrect labels), and sadness (32 incorrect labels). For the scenario intended to invoke the emotion of anger, most incorrect responses involved indefinite responses (58/96), and a proportion of the incorrect responses referred to sadness (25/96), suggesting some confusion between anger and sadness. For the scenarios evoking disgust and sadness, most incorrect responses referred to indefinite responses (73/89 for disgust and 21/32 for sadness). Most of these (87%) had a negative valence (e.g. ‘not happy’ for anger or for sadness, ‘wants to vomit’ for disgust).

In the drawing task (cf. Table 2B), the few drawings incorrectly depicting happiness were mainly neutral (12/18), while the drawings incorrectly depicting neutrality were mostly drawings of happy human figures (88/99). The incorrect depiction of sadness resulted in either the drawing of a happy human figure (16/42) or of a neutral human figure (15/42). When the drawing instructions required the depiction of anger, fear, or disgust, the incorrect responses generally involved a drawing of a neutral human figure (123/287) or otherwise a sad (65/287) or a happy human figure (49/287).
Potential effects due to providing feedback

The providing of feedback in the labelling task might have impacted participants’ responses to the labelling as well as drawing tasks. In the labelling task, it may have had a facilitating effect on the subsequent responses to the scenarios. Participants having feedback were likely to remove specific scenario-label associations from the full set of possible associations when dealing with subsequent scenarios. As a result, they could have produced a higher number of correct labels in the lastly evoked scenarios than in the first ones. This however did not occur: the distribution of correct responses produced with feedback following the temporal orders of presentation of the five scenarios (order 1: 67; order 2: 93; order 3: 97; order 4: 93; and order 5: 94) did not differ significantly from a distribution that could be expected by chance, $\chi^2(4, N = 444) = 6.81, p = .14$.

The providing of feedback might also have distracted participants’ responses to the subsequent drawing task, especially when the feedback was corrective (7% of the feedback). Indeed, in cases of corrective feedback, the experimenter obliged participants to reconsider and modify their initial representation of the emotion felt by Sam, so that it fitted in with a novel emotion. This required mental flexibility, and
participants lacking such flexibility were likely to fail to produce a correct drawing. For each emotion, we examined the distribution of the drawings into correct and incorrect responses when participants received corrective, simple or rewording feedback. Chi-square tests applied to these data revealed a significant difference only for anger. For anger, the number of incorrect drawings was higher than the number of correct drawings in participants who received corrective feedback (incorrect: 27 and correct: 6) as compared to those who received simple or rewording feedback (incorrect: 17 and correct: 46), $\chi^2(2, N = 96) = 37.89, p < .01$. Thus, as suspected, there was no facilitative effect of corrective feedback on drawing ability, and a disruptive effect occurred for the drawing of one emotion only: anger.

**Types of depictions of emotion in the correct drawings**

We finally examined the types of depiction of emotion in the correct drawings. Three types of graphic cues could depict emotion in drawing: facial expression (F); posture (P); and context (C). These could be used either alone or in combination in the drawing. We assessed how children combined these different categories progressively as a function both of age and of the emotion expressed in the drawing. The 493 correct drawings (clearly depicting the emotions of happiness, sadness, anger, fear, and disgust) were analysed according to the type of depiction of emotion used by the participants (cf. Table 3). Note that the conclusions drawn from the analyses presented below remained unchanged when the analysis excluded drawings that were produced consecutively of feedback in the labelling task ($N = 77$ drawings out of 493). Two judges

<table>
<thead>
<tr>
<th>Type of depiction</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>F</strong></td>
<td>Emotion is indicated by one or more graphic cues of facial expression. (Happiness: upturned mouth; Sadness: downturned mouth and/or eyes with tears; Anger: downturned mouth and/or teeth visible and/or creases on the face and/or downturned eyebrows; Fear: mouth open and/or zigzag mouth and/or eyes wide open; and Disgust: downturned mouth and/or mouth open and/or tongue hanging out and/or dribbling and/or downturned eyebrows and/or ‘pointy’ circumflex eyebrows)</td>
</tr>
<tr>
<td><strong>P</strong></td>
<td>Emotion is indicated by one or more graphic cues of posture. (Happiness: arms raised; Sadness: arms drooping by sides or hands raised to the face; Anger: arms raised or hands on hips; Fear: arms raised; and Disgust: arms raised)</td>
</tr>
<tr>
<td><strong>C</strong></td>
<td>Emotion is indicated by one or more graphic cues of context (Happiness, Sadness, Anger, Fear, and Disgust: linguistic symbols and/or people and/or surroundings and/or objects)</td>
</tr>
<tr>
<td><strong>FP</strong></td>
<td>Emotion is indicated by one or more graphic cues of facial expression and by one or more graphic cues of posture</td>
</tr>
<tr>
<td><strong>FC</strong></td>
<td>Emotion is indicated by one or more graphic cues of facial expression and by one or more graphic cues of context</td>
</tr>
<tr>
<td><strong>PC</strong></td>
<td>Emotion is indicated by one or more graphic cues of posture and by one or more graphic cues of context</td>
</tr>
<tr>
<td><strong>FPC</strong></td>
<td>Emotion is indicated by one or more graphic cues of facial expression, by one or more graphic cues of posture and by one or more graphic cues of context</td>
</tr>
</tbody>
</table>
worked independently to determine the type of depiction used in each drawing, using
the neutral drawing as a baseline. The inter-judge agreement was 99% (k coefficient for
inter-rater reliability was .99, p < .01). The numerical distribution of correct drawings
according to the type of depiction is presented in Table 4 for each emotion.

Taking all the emotions together, the results presented in Table 4 showed that the
participants relied principally on two types of depictions: F (201 drawings out of 493,
i.e. 41%) and FC (162 drawings out of 493, i.e. 33%). When the F and FC depictions put
together were contrasted with the other types of depictions put together, a binomial
distribution test (Siegel, 1956) indicated that the F and FC depictions represented the
majority for each of the emotions (ps < .01 in all cases).

Table 4. Numerical distribution of correct drawings according to the type of depiction for each
emotion

<table>
<thead>
<tr>
<th>Type of depiction</th>
<th>Happiness</th>
<th>Sadness</th>
<th>Anger</th>
<th>Fear</th>
<th>Disgust</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>F</td>
<td>52</td>
<td>72</td>
<td>25</td>
<td>28</td>
<td>24</td>
<td>201</td>
</tr>
<tr>
<td>P</td>
<td>1</td>
<td>–</td>
<td>2</td>
<td>–</td>
<td>–</td>
<td>3</td>
</tr>
<tr>
<td>C</td>
<td>10</td>
<td>1</td>
<td>2</td>
<td>15</td>
<td>5</td>
<td>33</td>
</tr>
<tr>
<td>FP</td>
<td>19</td>
<td>11</td>
<td>8</td>
<td>4</td>
<td>1</td>
<td>43</td>
</tr>
<tr>
<td>FC</td>
<td>52</td>
<td>34</td>
<td>19</td>
<td>31</td>
<td>26</td>
<td>162</td>
</tr>
<tr>
<td>PC</td>
<td>4</td>
<td>–</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>11</td>
</tr>
<tr>
<td>FPC</td>
<td>12</td>
<td>8</td>
<td>5</td>
<td>4</td>
<td>11</td>
<td>40</td>
</tr>
<tr>
<td>Total</td>
<td>150</td>
<td>126</td>
<td>63</td>
<td>85</td>
<td>69</td>
<td>493</td>
</tr>
</tbody>
</table>

Figure 2 shows the evolution with age of the numerical distribution of correct
drawings for the F and FC depictions. The results presented in Figure 2 show that the
use of the F and FC depictions varied according to age. The use of the F depiction
remained stable between 6 and 7 years, decreased between 7 and 8 years, then
increased until adulthood. The use of the FC depiction, relatively stable between 6 and 7
years, increased between 7 and 8 years then decreased until adulthood. Chi square
tests applied to these data indicated a significant decrease between the ages of 7 and
8 in the use of the F depiction (7-year-olds: 26/49 vs. 8-year-olds: 12/69; χ²(1, N = 118) = 16.70, p < .01), while a significant increase in the use of the FC
depiction was observed over the same period (7-year-olds: 13/49 vs. 8-year-olds: 46/69;
\(\chi^2(1, N = 118) = 18.46, p < .01\). Between the age of 8 and adulthood, we observed a significant increase in the use of the F depiction (8-year-olds: 12/69 vs. adults: 56/90; \(\chi^2(1, N = 118) = 32.07, p < .01\)) and a significant decrease in the use of the combined FC depiction (8-year-olds: 46/69 vs. adults: 12/90; \(\chi^2(1, N = 118) = 47.94, p < .01\)). Context cues that were introduced in the correct drawings mostly corresponded to one or more of the elements mentioned in the scenario (\(M = 87\%\), between 75 and 100\%). For example, for happiness, the children drew a present and/or a bicycle, for fear, they drew a ghost (see Figure 3).

We wondered to what extent the overwhelming use of the FC depiction at the age of 8 led the judges to identify the emotion on the basis of the contextual graphic cues. In order to determine the role of the contextual graphic cues in the identification of the emotions, we eliminated the contextual elements present in the 46 correct drawings produced by 8-year-old children containing a FC depiction. These drawings were then shown to three adult judges who had to determine the emotion expressed (the evaluation was carried out according to the same procedure as that used in the initial evaluation procedure, cf. Data analysis). If the presence of context cues in the 46 8-year-olds’ drawings was crucial to the graphic depiction of emotion, then a significant decline in the number of drawings considered correct should result from the new evaluation. A binomial distribution test carried out on the results of this new evaluation revealed that the majority of drawings was considered correct (31/46, i.e. 67\%). The happy (12 drawings) and sad (12 drawings) human figure drawings were all judged as being correct, in contrast to the human figure drawings expressing the emotions of anger (4/6), of fear (1/5), and of disgust (2/11). Thus, the presence of context cues in the drawings produced by 8-year-olds contributed to a certain extent to the depiction and identification of the emotions of anger, fear, and disgust.

Discussion

The point of the present study was to demonstrate the relevance of a drawing task involving an expressive human figure for evaluating the understanding of basic emotions (happiness, sadness, anger, fear, and disgust) among children of 6 to 11 years old. To this end, we conducted a comparative analysis of the ability of children to label freely the basic emotions on the basis of detailed prototypical emotional scenarios (labelling task) and their ability to express the emotions graphically in their human figure drawing (subsequent drawing task). This is the first study to attempt such a

![Figure 3. Examples of expressive drawings.](image)
comparison by using a within-subjects design, the two tasks belonging to relatively
distinct fields of investigation.

One of the most noteworthy results of this study is the remarkable similarity between
the success levels obtained in the labelling task and the drawing task. This
suggests that the development of the child’s understanding of prototypical emotional
situations and the development of his or her analytic comprehension of the basic
emotions proceed at the same pace. In the same vein, the prevalence of consistent
participants (i.e. participants who either succeeded or failed at both tasks) over
inconsistent ones suggested tight connections between the two tasks. However, results
from the inconsistent participants suggested that in case of inconsistency, success at
labelling an emotion from a scenario was usually achieved prior to success at depicting
the emotion in the human figure drawing. This discrepancy is likely to be due to the
higher complexity of the drawing task.

The parallelism between the results obtained in the verbal (labelling) and non-verbal
(drawing) tasks does not mean that the two tasks assessed exactly the same aspect
of children’s understanding of emotion. The labelling task tested the comprehension
of prototypical situations which normally accompany the basic human emotions.
It provided information on the child’s scriptural knowledge about prototypical
emotional situations. Because it required also the production of emotional labels, it also
gave us information on the child’s linguistic ability with respect to the vocabulary of the
emotions (linguistic repertoire). The drawing task, on the other hand, tested the analytic
comprehension of the basic human emotions and their means of expression (by facial
expression, posture, or context). It provided us with information on the schematic
representations of facial expression or posture expressing emotions constructed by the
child. Since it required the production of many different graphic cues depicting emotion
(e.g. downturned mouth, eyes wide open), it informed us also about the degree of
development and the richness of the graphic repertoire that the child dispose of to
depict emotions. Despite these specificities, both the labelling and drawing tasks were
suited well to assess children’s understanding of basic emotions.

From a developmental point of view, we observed a steady increase in the correct
response between the ages of 6 and 8, and then between the age of 8 and 12, indicating a
relatively gradual development of the comprehension of emotions in the course of
childhood. Moreover, the results revealed a clear developmental sequence with respect
to the emotions, in agreement with that found in the literature: the understanding
of happiness (90% correct responses at 6 years old) preceded that of sadness and fear
(70% correct responses at 8 years old) which in turn preceded the understanding of
anger and disgust (40% correct responses at the age of 11). However, our results
indicated a significant difference between the two tasks for the emotion of fear, which is
much easier to label than to draw. This difference may be linked in part to the difficulty
of the graphic depiction of fear, requiring the production of relatively complex graphic
cues, like the zigzag mouth, or the eyebrows in a specific position (see also Sayil, 2001).
This difference could be explained on the other hand by the use of an emotional
scenario particularly prototypical for the child, which simplifies the task of labelling
fear. According to a study by Widen and Russell (2007), a ‘fancy’ scenario (e.g. a
monster in the cupboard) evokes fear more readily than a ‘realistic’ scenario (e.g. a
growling dog), particularly among young children.

Other studies using free labelling tasks (Markham & Adams, 1992; Widen & Russell,
2003; Wiggers & van Lieshout, 1985) obtained similar success levels to those found in our
study for the emotions of happiness, sadness, and fear, and higher success levels for the
emotions of disgust and anger. However, the results obtained for this type of task depended largely on the criteria used in judging the accuracy of the emotional labels produced. In our study, the criteria used were fairly restrictive. It would probably be possible to improve children's results significantly by using less rigid criteria such as those used by Widen and Russell (2003) with young children (2- to 5-year-olds) for example.

Compared with other studies which use human figure drawing tasks (Brechet et al., 2007; Golomb, 1992; Picard et al., 2007), our study was the first to examine the depiction of the emotions of fear and disgust. We found a correct depiction of fear from the age of 8, by means of facial expressions which were either specific (zigzag mouth) or shared with the expression of surprise (mouth and eyes wide open, Brechet et al., 2007). Disgust was correctly indicated from the age of 9 by means of specific facial expressions (tongue hanging out and circumflex eyebrows) sometimes combined with those used to depict anger (downturned mouth and downturned eyebrows). The success levels obtained in our study were similar to those found in previous research for anger (Brechet et al., 2007) but were higher for happiness and sadness (Brechet et al., 2007; Picard et al., 2007). These differences might be attributed to the fact that our study used a detailed emotional scenario which probably elicited better results than the brief instructions which simply mentioned the emotional term. The use of emotional scenarios therefore provided a convenient background for completing the subsequent graphic task.

Our analyses revealed the dominant use of a facial depiction of emotion at all ages except 8 years old, when contextual cues appeared to a large degree. It was interesting to note the transitory character of this phenomenon. The use of contextual cues by the 8 year-olds appeared to be unnecessary for the emotions of happiness and sadness, insofar as a simple facial expression was sufficient to identify these emotions. On the other hand, the addition of contextual cues to the facial expression played a key role in the depiction of the more complex emotions of anger, fear, and disgust, contributing largely to their identification. Certain characteristics of facial expression depicting anger (e.g. downturned eyebrows and creases on the face) usually appeared in drawings at about the age of 11 (Brechet et al., 2007; Golomb, 1992; Sayil, 2001), whereas contextual cues emerged from the age of 8, whatever the emotion to be depicted (Brechet et al., 2007; Golomb, 1992). Contextual cues depicted by children were in tight relation to elements evoked in the scenarios. It is therefore likely that the scenarios promoted the introduction of contextual cues in drawings produced at age 8.

In the drawing task, children's ability to depict a person expressing no emotion (in response to a story in which the person 'is thinking of nothing in particular') remained very low up to the age of 10. The analysis of errors revealed that drawing which failed to express neutrality tended to express happiness (see also Picard et al., 2007). One possible interpretation of this finding is that the ability to deliberately draw a person expressing no emotion did not occur in the child before the age of 10. However, the analysis of errors suggested that the child was able to draw a person with no visible emotion, at least non-deliberately. It is possible that before the age of 10, children gave a different interpretation of the scenario than the one expected: for them, a person who 'is thinking of nothing in particular' was happy (see also Gosselin, 1995). It would therefore be interesting to use instructions which specify more explicitly the neutral emotional state of the to-be-drawn person (e.g. a person 'who feels no emotion, or is neither happy nor sad') in order to get baseline drawings. Having available a neutral baseline drawing is crucial to detect and interpret expressive graphic cues in children's drawings (Burkitt & Newell, 2005; Burkitt et al., 2003a, 2003b; Picard et al., 2007).
In line with the literature, our study underlined the fact that the child’s understanding of the basic emotions is marked by a clear distinction between the simple emotions (happiness and sadness) and the more complex ones (fear, anger, and disgust). Labelling and drawing tasks concerning the former are mastered earlier than those concerning the latter. Two types of interpretation have been proposed in the literature. A first interpretation attributed the observed disparity between the emotions to a greater or lesser perceptual discriminability in the facial expressions associated with the basic emotions (Gibson & Spelke, 1987). The facial expressions of the basic emotions which make use of the same facial features (e.g. fear and surprise, anger and disgust, Ekman & Friesen, 1978) are more difficult for the child to distinguish from a purely perceptual point of view than the emotions which share few or no facial features (e.g. happiness and sadness). With age, the child gradually becomes more aware of the facial features which discriminate between the various emotions, enabling him or her to avoid certain mistakes involving typical confusions concerning the complex emotions (Camras, 1980; Gosselin, 1995; Gosselin & Laroque, 2000; Gosselin & Simard, 1999).

An interpretation in terms of perception does not seem sufficient to explain the observed results. It should be recalled that our study did not involve the child’s perceptual abilities directly, unlike the tasks involving perceptual categorization or discrimination between facial expressions. The confusions typically observed between the emotions involving similar facial features did not occur in our study, even when the same facial expression cues were used to express the complex emotions (anger and disgust, fear and surprise, Brechet et al., 2007). The analysis of the errors observed in the drawing task suggested that graphic constraints (limitation of drawing skill) may be more important than perceptual constraints for the children, whose main mistakes consisted in producing drawings which were either neutral, happy, or sad – drawings for which the child had acquired the necessary cues at a relatively early age.

According to a second interpretation, the developmental sequence observed might be due to the development in the child of a categorical conceptualization of the emotions, which become more and more differentiated over time (Russell & Bullock, 1986; Widen & Russell, 2003). According to this interpretation, children initially have at their disposal wide emotional categories based largely on the principles of emotional valence (positive vs. negative) and arousal. These categories become more and more precise and differentiated in the course of cognitive development, allowing the child to discriminate between complex basic emotions such as anger, fear, and disgust.

The results of our study tend to support this analysis: while children seemed able at an early age to differentiate between two categories of emotion which were in opposition (happiness and sadness), the more complex emotions of anger, fear, and disgust were relatively poorly differentiated, suggesting that they belong to the same wide category of negative emotions. Widen and Russell (2004) have shown that the evocative power of the behavioural consequence (e.g. vomiting, in the case of disgust) is stronger for anger and disgust than for the other basic emotions among 3- to 4-year-olds. These young children are more sensitive to the behavioural consequence than to the emotional label itself, in the case of these two emotions. These findings are consistent with the errors which we observed in the labelling task: these concerned principally anger and disgust, and corresponded to labels of the correct (negative) valence, but which did not evoke sufficiently precisely the target emotional category.

In conclusion, results from our study confirm and broaden the contribution of previous studies on the expression of emotions in children’s drawings (e.g. Burkitt & Newell, 2005; Cox, 2005; Golomb, 1992; Jolley, Fenn, & Jones, 2004; Jolley &
Our study shows that a drawing task involving an expressive human figure is an original and relevant tool for the study of the child’s comprehension of human emotions. This conclusion is supported by the strong similarity in the success levels achieved in this non-verbal task, and in the more classic verbal task involving the labelling of emotions evoked by prototypical scenarios. However, whether these results might be taken to suggest some relationship between verbal and non-verbal understanding of emotion in children cannot be established here, and may therefore call for further investigations.

Considering that the development of the child’s understanding of the basic emotions has a number of different facets, it could be interesting in future research to use drawing tasks in combination with other types of tasks (e.g. verbal and perceptual), in order to obtain a more complete view of the development of the child’s understanding of the basic human emotions (for more on this participant, see Markham & Adams, 1992). In our view, the use of a drawing task presents several advantages: (1) Because there is little use of language, it can be used on participants with linguistic impairment, for whom it would be difficult to express their understanding of emotions verbally. (2) This task can elicit a more precise understanding of emotions, since it requires an explicit analytic understanding of emotions and of their human expression, compared with tasks involving the use of photos, in which success can be achieved with a more holistic appreciation of the stimulus. (3) The drawing task allows us to deduce the type of schematic representation of the human figure expressing an emotion which the child possesses, or which he or she produces for the task. This schematic representation may be thought of as being the translation into graphic terms of a conceptual representation of the emotions and their human expression. In this perspective, children’s drawings can be viewed as an indirect mean to examine children’s internal representations. (4) Finally, the drawing task described in our study, combined with the rigorous method for detecting expressive graphic cues, might be very useful tools for clinicians or therapists who use and interpret children’s expressive drawings within a projective approach (see e.g. Burkitt & Newell, 2005; Hammer, 1997; Thomas & Jolley, 1998).

Acknowledgements

The first author would like to thank Geoff Chambers for his reading of the paper.

References


Received 1 February 2008; revised version received 5 July 2008
**Appendix**

Emotional scenarios used in the labelling task

<table>
<thead>
<tr>
<th>Emotion</th>
<th>Scenario</th>
</tr>
</thead>
<tbody>
<tr>
<td>Happiness</td>
<td>'Sam had always dreamed of having a bicycle so as to go riding with friends. Today is Sam’s birthday. Sam has invited some friends for a party. They give to Sam an enormous present. Sam opens the present, and inside there's a super bicycle'</td>
</tr>
<tr>
<td>Sadness</td>
<td>'Sam has a little cat. Every evening at home Sam plays with the cat, stroking it and cuddling it. Sam loves this cat. But one evening, Sam comes home and the little cat isn’t there. Sam looks for the cat everywhere, but can't find it. The little cat is lost'</td>
</tr>
<tr>
<td>Anger</td>
<td>'Sam has spent two whole hours making cookies. When they were cooked, Sam took the cookies out of the oven and put them on the window sill to let them cool. When Sam goes to fetch the cookies, Sam discovers that the neighbour’s dog has knocked the cookies to the ground and is eating them'</td>
</tr>
<tr>
<td>Fear</td>
<td>'Sam has to go to the cellar to fetch a pot of jam. But the cellar is dark and cold. Courageously, Sam opens the door of the cellar and starts to go down the stairs. Suddenly, Sam hears a strange noise, and sees a shadow which looks like a ghost'</td>
</tr>
<tr>
<td>Disgust</td>
<td>'Sam is shopping in the market. There are some lovely apricots, and Sam thinks the apricots would be perfect to make a nice tart. Sam bites into one of the apricots to see what it tastes like, but the apricot is full of maggots. Sam has a horrible taste in the mouth'</td>
</tr>
<tr>
<td>Neutral</td>
<td>'Sam is walking in the street. It is a normal day. Sam is thinking of nothing in particular'</td>
</tr>
</tbody>
</table>