Recognizing Emotion in Faces:
Developmental Effects of Child Abuse and Neglect

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The contributions to the recognition of emotional signals of (a) experience and learning versus (b) internal predispositions are difficult to investigate because children are virtually always exposed to complex emotional experiences from birth. The recognition of emotion among physically abused and physically neglected preschoolers was assessed in order to examine the effects of atypical experience on emotional development. In Experiment 1, children matched a facial expression to an emotional situation. Neglected children had more difficulty discriminating emotional expressions than did control or physically abused children. Physically abused children displayed a response bias for angry facial expressions. In Experiment 2, children rated the similarity of facial expressions. Control children viewed discrete emotions as dissimilar, neglected children saw fewer distinctions between emotions, and physically abused children showed the most variance across emotions. These results suggest that to the extent that children’s experience with the world varies, so too will their interpretation and understanding of emotional signals.

Beginning with Darwin (1872/1965), opposing hypotheses have been proposed regarding the initial state of the complex systems that children use to recognize what others are feeling. The nativist position is supported by evidence such as the production of facial expressions very early in postnatal life (Caron, Caron, & Meyers, 1982; Haviland & Lelwica, 1987; Oster, 1978; Oster & Ekman, 1977) and cross-cultural similarities in emotion recognition (Ekman, Sorenson, & Friesen, 1969; Izard, 1971). The contrasting empiricist argument, that recognition of emotion is learned through experience, is based on the gradual refinement with age of children’s production and recognition of emotional signals (Fogel et al., 1992; Klinnert, Emde, Butterfield, & Campos, 1986). Parsing the relative contributions of experience and learning versus internal predispositions for emotion recognition remains complicated, however, because children are virtually always exposed to rich, complex, and perhaps even cross-culturally similar emotional experiences from birth. The research described in this article focused on the influences of learning in the ontogenesis of emotional processing by employing “natural experiments” involving children who had atypical emotional experiences.

In this research, we investigated how children who experienced two different types of aberrant parenting—physical abuse (acts of commission) and physical neglect (acts of omission)—recognized facial displays of emotion. The primary benefit of studying the ontogenesis of emotion among maltreated children is that the basic emotional environment experienced by most children may be so invariant that environmental influences are masked. For the physically abused child, displays of anger may be the strongest predictor of threat; however, increased sensitivity to anger could result in decreased attention to other emotional cues. The neglected child, in contrast, may suffer from an extremely limited emotional learning environment.

Studies of maltreating families suggest that neglectful and physically abusive parents differ from nonmaltreating parents in both the frequency and content of their emotional interactions with their children. Compared with control parents, maltreating parents show less positive emotion (Bugental, Blue, & Lewis, 1990; Burgess & Conger, 1978; Kavanagh, Youngblade, Reid, & Fagot, 1988) and more negative emotion (Herrenkohl, Herrenkohl, Egolf, & Wu, 1991; Lyons-Ruth, Connell, Zoll, & Stahl, 1987). Maltreating parents also tend to isolate themselves and their families from others, leaving their children exposed to fewer nonparental models of emotion.
emotional communication (Salzinger, Feldman, Hammer, & Rosario, 1993). Studies contrasting different types of maltreating families have suggested that physically abusive parents interact with their children more frequently than neglectful parents but are more negative and direct higher rates of verbal and physical aggression toward their young children (Bousha & Twentyman, 1984; Crittenden, 1981). Therefore, not only do physically abused children receive sporadic, high-intensity aggressive outbursts from their parents, but they also experience stable, frequent patterns of aggression. In these same studies it was reported that neglectful parents are less expressive toward, and less engaged with, their children and provide relatively little exchange of affective information (Bousha & Twentyman, 1984; Crittenden, 1981). Although research on maltreatment has not specifically related children's knowledge about emotions to family emotional environment, there is evidence from both laboratory and observational studies that neglected children suffer from impoverished opportunities for interactions with adults and receive less support in learning to decode emotional signals, whereas children in physically abusive environments are also exposed to episodes of heightened hostility and interpersonal threat.

Recognition of emotion is particularly important because it represents the early utilization of social cues on which children's subsequent interpretations and behavioral responses will depend. Maltreated children have myriad problems involving the recognition (Cummings, Hennessy, Rabideau, & Cicchetti, 1994; George & Main, 1979; Hennessy, Rabideau, Cicchetti, & Cummings, 1994; Klimes-Dougan & Kistner, 1990), expression (Gaensbauer, Mazerek, & Harmon, 1981), and understanding of emotions (for a review, see Camras, Sachs-Alter, & Ribordy, 1996). Of particular concern is the association between such difficulties in emotion processes and increased risk for the development of various psychological disorders in these children (Cicchetti & Toth, 1995a).

Typically, preschoolers can accurately identify basic emotions from both facial and contextual cues (Reichenbach & Masters, 1983; Walden & Field, 1982); yet maltreated children are reported to have lower accuracy in recognizing emotions than nonmaltreated children, even after cognitive ability is controlled for (Camras, Grow, & Ribordy, 1983; Camras et al., 1988; During & McManus, 1991). Other studies have indicated that maltreated children may be more, rather than less, likely to respond to angry or aggressive emotional cues (Dodge, Pettit, Bates, & Valente, 1995; Pollak, Cicchetti, Klorman, & Brumagim, 1997; Pollak, Klorman, Brumagim, & Cicchetti, in press; Riedel & Cicchetti, 1989). These findings may not be as contradictory as they appear. For example, despite maltreated children's poor overall performance in recognizing emotions, Camras, Ribordy, Hill, and Martin (1990) noted a marginal trend for them to perform better than control children in detecting masked expressions of emotion and a tendency for maltreated children's errors to reflect a bias toward detection of anger. Thus, it is possible that subtle task demands or subject-related factors may obscure processing differences among maltreated children.

In this article we report two studies that examine the effects of different forms of aberrant experience on the development of emotion recognition. We reasoned that acts of emotional omission, reflected in physical neglect, would result in generalized and global delays in the recognition and understanding of emotional signals. In contrast, children who experienced acts of unusual emotional commission, such as physical abuse, were expected to display increased accuracy for the detection of threat-related information such as anger despite poor performance in recognizing other emotions.

**Experiment 1**

This experiment examined children's ability to match a facial display with an emotional context. Individual differences in children's ability to make optimal developmental use of their emotional experiences may be contingent on their environmental input (Camras et al., 1990). Because experiences of threat may heighten children's awareness of angry cues, we predicted that physically abused children would be better at recognizing anger than would physically neglected children. The neglected children's presumed limited experiences with emotion learning were expected to be reflected in low accuracy scores across emotions. Finally, on the basis of reports of inattention and misinterpretation of emotional cues among heterogeneous samples of maltreated children (Dodge et al., 1995), we predicted that the emotion recognition abilities of physically abused children would show deficits relative to those of nonmaltreated children for emotions other than anger.

**Method**

**Participants.** Participants were 16 physically neglected, 17 physically abused, and 15 nonmaltreated children, ranging in age from 3 years 3 months to 5 years 6 months. Using Child Protective Service (CPS), clinical, and medical records, seven doctoral-level psychologists with expertise in child maltreatment research classified the children's maltreatment histories using the classification system described by Barnett, Manly, and Cicchetti (1993). These raters had previously achieved reliability on a common set of case records (see Toth, Cicchetti, Macfie, & Emde, 1997); the authors of the present article did not code the records of children participating in this experiment. Physical abuse was indicated when there was evidence of a caregiver inflicting physical injury on a child by other than accidental means. Physical neglect was coded when it was documented that a caregiver failed to meet the child's minimum physical needs. Specific hypotheses were not advanced for children who were sexually abused, who witnessed violence, or who experienced emotional abuse in the absence of physical abuse or neglect; therefore, these groups were not included in this study. The maltreated children were participating in a therapeutic preschool program, and the nonmaltreated children were recruited from a university pediatric clinic that serves low-income families. Receipt of services from either program was not contingent upon voluntary participation in this research. Nonmaltreating parents gave permission for us to verify that they were free of CPS preventive or protective service records. Each child was rewarded with a small toy, and parents were reimbursed only for transportation expenses. Because nonmaltreated children were recruited to match

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2 In the present samples, physical abuse included bruises, abrasions, or welts to the child's body; CPS references to excessive physical punishment; burns or lacerations; disfiguring or life-threatening injuries; and severe injuries requiring hospital treatment. Examples of physical neglect included failure to ensure medical care or follow through on medical recommendations; reports of children being very hungry and missing meals frequently; a child's living environment being condemned as unfit for habitation; and young children being left unsupervised for several hours in potentially life-threatening situations. Maltreatment subtypes were classified hierarchically such that none of the children had documented sexual abuse, neglected children did not have records indicating physical abuse, and physically abused children may also have experienced neglect.
the maltreated samples as closely as possible on background variables, the three groups did not differ with respect to age, F(2, 47) < 1, ns; Peabody Picture Vocabulary Test—Revised (PPVT-R) standard score, F(2, 47) < 1, ns; socioeconomic status, F(2, 47) = 1.15, ns; race, χ²(2, N = 48) < 1, ns; or sex, χ²(2, N = 48) < 1, ns. (See Table 1.)

Procedure and materials. The emotion recognition task was originally developed by Dashiell (1927) and adapted by both Ekman and Friesen (1971) and Ribordy, Camras, Stefanì, and Spaccarelli (1988). Children were individually presented with 25 brief vignettes (see Appendix) depicting five stories in each of which the protagonist experienced happiness, sadness, disgust, fear, and anger. Because the present sample was younger than that used by Ribordy et al. (1988), we did not include the emotion category of surprise, for which accuracy was less than 75% for typically developing 6–8-year-old children. After hearing each story, the child was asked to point to the face appropriate for the protagonist in the story. The gender of the model was matched to the gender of the child. Both the order in which stories were presented and the placement of target and foil photographs (from right to left) were randomized. Each emotion was presented equally with every other emotion as foils. Each child received accuracy scores for each of the five emotion categories that reflected his or her percentages of correct responses. Following the emotion recognition task, children were administered the PPVT–R (L. M. Dunn & Dunn, 1981).

Results

Children’s accuracy scores were submitted to a repeated measures analysis of covariance with maltreatment group (control, neglect, or physical abuse) and child’s gender as between-subjects factors and emotion (anger, disgust, fear, happiness, and sadness) as a within-subject factor. Children’s receptive vocabulary scores and age were treated as covariates. Probability values for repeated measures are reported with Greenhouse–Geisser corrections.

Nonmaltreated children correctly recognized a higher percentage (66%) of emotions than did neglected (51%) and physically abused (59%) children, F(2, 47) = 3.80, p < .05. Across samples, children’s accuracy did not differ on the basis of emotion, F(4, 160) = 1.36, ns; gender, F(1, 40) = 1.28, ns; or age, F(1, 40) = 3.17, ns. However, children with higher receptive vocabulary scores performed better on the task, F(1, 40) = 5.47, p < .05. A significant interaction of maltreatment group and emotion, F(8, 160) = 2.26, p < .05, was followed up by one-way analyses of variance conducted separately for each emotion. These analyses indicated that accuracy scores for the three groups of children differed for anger, F(2, 47) = 8.27, p < .01, and sadness, F(2, 47) = 3.45, p < .05; there was also a marginal trend for the groups to differ in the recognition of disgust, F(2, 47) = 3.07, p = .056 (see Figure 1). Post hoc Scheffé tests revealed that physically abused children did not differ from controls in the recognition of anger, t(45) = –1.57, ns, whereas neglected children’s accuracy for anger was below that of both control children, t(45) = 2.51, p < .05, and physically abused children, t(45) = –4.05, p < .01. Physically abused children were less accurate in recognizing sadness than were controls, t(45) = 2.60, p < .05, whereas the neglect group did not differ from either controls, t(45) = 1.59, ns, or physically abused children, t(45) = 1.05, ns. The marginal group effect for disgust reflects the fact that neglected children’s scores were significantly lower than those of controls, t(45) = 2.87, p < .01, but not those of physically abused children, t(45) = –1.52, ns.

Signal detection statistics were used to further examine the nature of children’s emotion recognition performance. Each child’s performance was represented as follows: Hit rate (HR) was the probability of selecting the facial expression that matched the context of the vignette; false alarm rate (FAR) was the probability of selecting a facial expression that did not match the emotion vignette; a correct rejection was the probability of not selecting an incorrect face; and a miss was the probability of not selecting the correct facial expression. In this three-alternative forced-choice design, the probabilities of hits plus misses sum to 1.0, and the false alarm and correct rejection rates also sum to 1.0. Therefore, the HR sufficiently describes children’s responses to correct items, and the FAR sufficiently describes children’s responses to incorrect items. Taken together, the HR and the FAR completely summarize the performance of a single subject in a single emotion condition.

HRs and FARS were combined into two statistics that describe children’s (a) sensitivity to differences between emotion expressions and (b) response biases or willingness to define an ambiguous stimulus as a target. Typically, signal detection measures such as d’ and β (or the nonparametric approximations, A’ and B’) are used to measure sensitivity and bias, respectively. However, when subjects’ recognition accuracy is low, these statistics have been shown to lack independence, and threshold models have been suggested as more appropriate measures (Snodgrass & Corwin, 1988). The threshold model assumes that false alarms occur when the subject is uncertain. Hits represent both the proportion of

Table 1

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Physical abuse (n = 16)</th>
<th>Neglect (n = 17)</th>
<th>Control (n = 15)</th>
<th>Marginal (n = 48)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (in months)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>52.0</td>
<td>53.7</td>
<td>51.9</td>
<td>52.7</td>
</tr>
<tr>
<td>SD</td>
<td>6.3</td>
<td>8.1</td>
<td>6.5</td>
<td>6.9</td>
</tr>
<tr>
<td>PPVT–R (standard score)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>88.7</td>
<td>87.2</td>
<td>90.4</td>
<td>88.7</td>
</tr>
<tr>
<td>SD</td>
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<td>16.6</td>
<td>24.2</td>
<td>19.3</td>
</tr>
<tr>
<td>SES (Hollingshead Index)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>21.3</td>
<td>18.8</td>
<td>24.3</td>
<td>21.4</td>
</tr>
<tr>
<td>SD</td>
<td>6.8</td>
<td>8.6</td>
<td>14.1</td>
<td>10.2</td>
</tr>
<tr>
<td>Race (% Caucasian)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>44</td>
<td>53</td>
<td>60</td>
<td>52</td>
</tr>
<tr>
<td>Sex (% female)</td>
<td>31</td>
<td>42</td>
<td>47</td>
<td>40</td>
</tr>
</tbody>
</table>

Note. PPVT–R = Peabody Picture Vocabulary Test—Revised; SES = socioeconomic status.
correct identifications when the subject is certain plus any “lucky” correct guesses during states of uncertainty. The discrimination index, $P_r$ (the probability that an item will cross a recognition threshold), is thus

$$P_r = HR - FAR. \quad (1)$$

$P_r$ is similar to the more commonly used index, $d'$, which is calculated using the $z$-score transformations of these same values: $d' = z(HR) - z(FAR)$. The bias index ($B_r$) reflects how much evidence or certainty the child requires to select an emotional expression. False alarms occur when the child fails to correctly match a target face with the emotion conveyed in the vignette (which occurs with a probability $1 - P_r$). Thus $B_r$ is expressed as

$$B_r = \frac{FAR}{1 - (HR - FAR)}. \quad (2)$$

Higher values of $B_r$ indicate a liberal or lax response criterion, and lower values indicate a conservative or strict criterion for selecting an emotion expression.

Separate repeated measures analyses of variance were computed with emotion (anger, disgust, fear, happiness, sadness) as a within-subject variable, maltreatment status (control, neglect or physical abuse) as a between-subjects variable, and either sensitivity ($P_r$) or response bias ($B_r$) measures as dependent variables. For sensitivity, a main effect of emotion, $F(4, 180) = 23.23, p < .01$, indicated that children discriminated the happy face most easily. A main effect of maltreatment status, $F(2, 45) = 3.84, p < .05$, revealed that neglected children discriminated emotions more poorly than did the other two groups (neglect, $P_r = .29$; physical abuse, $P_r = .42$; control, $P_r = .52$). These results are presented in Figure 2. The interaction of emotion and maltreatment status for sensitivity was not significant.

Neither the main effect of emotion, $F(4, 180) = 2.28, p < .07$, nor the main effect of maltreatment status, $F(2, 45) < 1, ns$, on children’s response bias was significant. However, the interaction of maltreatment status and emotion was significant, $F(8, 180) = 2.60, p < .01$. This was a result of physically abused children using more liberal criteria for selecting angry faces than either the control, $t(45) = -4.32, p < .01$, or neglected, $t(45) = -3.80, p < .01$, children. In contrast, neglected children used more liberal criteria to select sad faces than did either the control, $t(45) = -2.03, p < .05$, or physically abused, $t(45) = 4.06, p < .05$, children (see Figure 3).

In summary, neglected children had more difficulty discriminating between emotional expressions than did control or physically abused children. Neglected children also evidenced a response bias, with a lower standard for selecting sad faces than that of the other children. Physically abused children were as sensitive to differences between facial expressions as were control children; however, they set a lower standard for selecting angry faces than did their peers.

Experiment 2

Performance on the emotion recognition task used in Experiment 1 may reflect either children’s visual discrimination of facial expressions or their conceptual understanding of the emotions represented by each facial expression. In Experiment 2 we investigated both of these possibilities. Both groups of maltreated children were expected to indicate less differentiation of negative emotional displays than were nonmaltreated children—with the exception that physically abused children were expected to differentiate anger from other negative displays to a greater extent than were neglected children. Thus, differences in similarity ratings were used to draw inferences about children’s understanding of emotion expressions.
Method

Participants. Participants were 15 physically neglected, 13 physically abused, and 11 nonmaltreated children, ranging in age from 3 years 5 months to 5 years 8 months. Procedures for recruitment and classification of children were identical to those described in Experiment 1. As shown in Table 2, the samples did not differ with respect to age, F(2, 38) = 1.93, ns; PPVT-R scores, F(2, 38) < 1, ns; socioeconomic status, F(2, 38) = 2.80, ns; race, χ²(2, N = 39) = 4.8, ns; or gender, χ²(2, N = 39) = 1.43, ns.

Procedure and materials. Stimuli were 42 black-and-white 8 × 10 in. glossy photographs of facial expressions representing anger, happiness, sadness, fear, disgust, and neutrality (Ekman, 1976).

Emotion discrimination task. This paradigm was adapted from Borod et al. (1990) to evaluate perceptual discrimination of emotions. Each child was tested individually and was shown two photographs of different models posing emotional expressions. The child indicated whether the two models were expressing the same or different feelings. Each of the six emotions was paired twice with every other emotion, resulting in 42 trial pairs. Children’s responses (1 = correct, 0 = incorrect) were summed and averaged for each pairing.

Results

Discrimination accuracy. A repeated measures analysis of covariance on children’s perceptual discrimination of facial expressions was conducted with maltreatment group (control, neglect, or physical abuse) and child’s gender as between-subjects factors and emotion (anger, disgust, fear, happiness, sadness, or neutrality) as a within-subject factor. Age and PPVT-R scores were treated as covariates. Children’s ability to discriminate facial expressions did not differ on the basis of emotion, F(5, 155) = 1.19, ns; maltreatment group, F(2, 31) < 1, ns; age, F(1, 31) < 1, ns; or receptive vocabulary, F(1, 31) = 3.11, ns.

Emotion similarity ratings. Children’s ratings of the similarity between emotional expressions were examined through a repeated measures analysis of covariance with maltreatment group (control, neglect, or physical abuse) and child’s gender as between-subjects factors and emotion pair (angry-disgusted, angry-fearful, angry-happy, angry-neutral, angry-sad, fearful-disgusted, happy-

Figure 2. Mean sensitivity (P₁) and standard errors for control (n = 15), neglected (n = 17), and physically abused (n = 16) children in response to differing stimulus conditions.

Figure 3. Mean response bias (B₁) and standard errors for control (n = 15), neglected (n = 17), and physically abused (n = 16) children in response to differing stimulus conditions. Higher values on this index denote a more liberal or lax response bias, and lower values indicate a more conservative or strict bias.

Table 2

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Physical abuse (n = 13)</td>
</tr>
<tr>
<td>Age (in months)</td>
<td>M 56.6</td>
</tr>
<tr>
<td>SD</td>
<td>4.0</td>
</tr>
<tr>
<td>PPVT-R (standard score)</td>
<td>M 82.0</td>
</tr>
<tr>
<td>SD</td>
<td>15.6</td>
</tr>
<tr>
<td>SES (Hollingshead Index)</td>
<td>M 22.4</td>
</tr>
<tr>
<td>SD</td>
<td>8.1</td>
</tr>
<tr>
<td>Race (% Caucasian)</td>
<td>53.8</td>
</tr>
<tr>
<td>Sex (% female)</td>
<td>21.4</td>
</tr>
</tbody>
</table>

Note. PPVT-R = Peabody Picture Vocabulary Test—Revised; SES = socioeconomic status.
disgusted, happy–fearful, happy–neutral, happy–sad, neutral–
disgusted, neutral–fearful, sad–disgusted, sad–fearful, and sad–
neutral) as a within-subjects factor. Age and PPVT–R scores were
treated as covariates, and Greenhouse–Geisser corrections for re-
peted measures are reported.

Children’s similarity ratings were not related to age, $F(1, 31) < 1$, ns, or gender, $F(1, 31) < 1$, ns, although children with
higher receptive vocabulary scores rated emotion exemplars as
more dissimilar, $F(1, 31) = 7.16, p < .05$. Nonmaltreated children
($M = 3.7, SD = .26$) rated exemplars as more dissimilar than
neglected ($M = 2.5, SD = .22$) or physically abused ($M = 2.5,
SD = .27$) children, $F(2, 31) = 6.37, p < .01$. To qualify the
significant Emotion $\times$ Maltreatment group interaction, $F(28,
434) = 2.22, p < .001$, we conducted separate one-way analyses
of variance on each emotion pairing. These analyses resulted in
three patterns of results, as shown in Figure 4 and Table 3. One
pattern of ratings indicated that both groups of maltreated children
perceived less dissimilarity between expressions than did nonmal-
treated children: angry–neutral, $F(2, 38) = 3.93, p < .05$; sad–
near, $F(2, 38) = 4.66, p < .05$; fearful–sad, $F(2, 38) = 7.35,
p < .01$. A second set of findings suggested that only neglected,
but not physically abused, children differed from nonmaltreated
controls: angry–disgusted, $F(2, 38) = 4.37, p < .05$; angry–
fearful, $F(2, 38) = 21.47, p < .001$; angry–sad, $F(2, 38) = 5.21,
p < .01$; happy–sad, $F(2, 38) = 8.21, p < .01$. Children in all three
groups had equivalent similarity ratings for the remaining pairs (all
$ps > .2$).

To summarize, neglected children perceived less distinction
between angry, sad, and fearful expressions than did control chil-
dren; physically abused children and control children perceived
more distinction between anger and other negative emotional
expressions than did neglected children.

General Discussion

The present data demonstrate that the nature of children’s emo-
tional learning environments results in nonrandom effects on the
development of their emotion recognition abilities. In Experi-
ment 1, we compared nonmaltreated, physically neglected, and
physically abused preschool-age children’s ability to recognize
emotions through contextual cues. Physically neglected children
accurately recognized emotions less frequently than did nonmal-
treated or physically abused children, even after we statistically
controlled for receptive language. More specifically, neglected
children had more difficulty discriminating differences between
emotional expressions. Although physically abused children had
difficulty recognizing emotions such as sadness and disgust, their
accuracy in recognizing anger did not differ from that of nonmal-
treated children. Signal detection analyses revealed that physically
abused children used a more liberal bias for selecting angry faces,
whereas neglected children used more liberal biases in selecting
sad faces; no selection bias emerged for the nonmaltreated chil-
dren. The findings from Experiment 2 indicate that maltreated
children’s lower recognition accuracy is not secondary to problems
at the visuoperceptual level, such as an impairment in their ability
to detect physical differences between facial expressions. Rather,
maltreatment seems to affect children’s understanding of particular
emotional displays.

Our expectation that most children would rate happiness as
dissimilar to the negative emotions was confirmed for all three
groups with a notable exception: Neglected children saw greater
similarity between happy and sad expressions than did the other
groups. This finding is especially surprising because recognition of
happiness usually emerges developmentally early (Sroufe, 1979),
suggesting that even relatively simple aspects of emotional recog-
Table 3
Matrices of Mean Similarity Ratings for Six Emotional Expressions, Separately by Maltreatment Group

<table>
<thead>
<tr>
<th>Emotional expression</th>
<th>Angry</th>
<th>Disgusted</th>
<th>Fearful</th>
<th>Sad</th>
<th>Happy</th>
<th>Neutral</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Control</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Angry</td>
<td>1.6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disgusted</td>
<td>2.4</td>
<td>1.4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fearful</td>
<td>4.4&lt;sup&gt;a&lt;/sup&gt;</td>
<td>3.1</td>
<td>1.2</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Sad</td>
<td>3.7&lt;sup&gt;b&lt;/sup&gt;</td>
<td>3.1</td>
<td>3.9&lt;sup&gt;e,f&lt;/sup&gt;</td>
<td>1.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Happy</td>
<td>3.9</td>
<td>3.7</td>
<td>4.1</td>
<td>4.4&lt;sup&gt;g&lt;/sup&gt;</td>
<td>1.1</td>
<td></td>
</tr>
<tr>
<td>Neutral</td>
<td>3.3&lt;sup&gt;c,d&lt;/sup&gt;</td>
<td>3.0</td>
<td>3.6</td>
<td>4.1&lt;sup&gt;h,i&lt;/sup&gt;</td>
<td>3.6</td>
<td>1.3</td>
</tr>
<tr>
<td><strong>Neglect</strong></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Angry</td>
<td>0.9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disgusted</td>
<td>1.3&lt;sup&gt;j&lt;/sup&gt;</td>
<td>1.0</td>
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*Note.* Scores that share subscripts are significantly different according to post hoc Scheffé tests ($df = 36, p < .05$, two-tailed). Note that the diagonals of the table correspond to pairs that are truly the same, so diagonal entries are expected to be small; off-diagonal entries correspond to pairs that are different and should be larger. In fact, this pattern holds only for control children.

...
gest a U-shaped function in which exposure to appropriate emotional expressiveness fosters good learning of emotion in children but in which increasing exposure to nonpathological anger and hostility or impoverished communication both lead to suboptimal learning of emotions. Denham et al. (1994) reported that the distress evoked in children by high levels of hostility undermines their ability to learn about emotions. However, the present data suggest that extreme or pathological hostility directed toward children may produce effects not seen in normative samples, such as relative hypervigilance to anger or threat-related cues.

The present data are consistent with the idea that such variance in emotional experience affects children’s recognition and understanding of affective cues. One possible experience-dependent mechanism for these developmental effects is that infants’ biological preparedness for emotion includes a general perceptual mechanism that becomes tuned to combinations of signals, which, through experience, combine to form affective categories. In this view, rather than possessing knowledge about specific emotions, the developing child possesses the ability to parse sensory inputs into meaningful units and to track the regularity, predictiveness, and temporal synchrony of this information in a manner similar to that exhibited with other cognitive abilities such as cross-modal matching, phonetic discrimination, and word segmentation (Kuhl, 1987; Kuhl & Meltzoff, 1982; Saffran, Aslin, & Newport, 1996). Although it appears that neglected children are exposed to fewer emotional learning opportunities and that physically abused children receive more hostile emotional cues, more research is required if we are to form a clear picture of the mechanisms linking children’s emotional environments with learning mechanisms for emotions. For example, the emotional signals the maltreated child receives may be disproportionately complicated, inconsistent, poorly conveyed, and possibly distressing, limited, or excessive. A solution to the learning problem created by aberrant emotional signals from parents may be general constraints imposed on children in the form of immature or limited resources, which require young children to filter or select some environmental cues over others (Bjorklund, 1997). This developmentally normal aspect of selective attention suggests that irrespective of the initial state of the organism, emotional development is contingent on the nature of the input or experiences made available to the child. These possibilities should be explored in future research, in which data on other populations of children who receive excessive or unusually limited emotional input (such as the offspring of parents with unipolar or bipolar depression, see Cicchetti & Toth, 1995b) can be used to illuminate the role of experience-dependent processes, such as experience and learning, in the ontogenesis of emotion.

References


(Appendix follows)
Appendix

Emotion Recognition Vignettes

Happy

1. Johnny/Susie wanted his/her friends to come over to play. So he/she asked them, and they came to play with him/her at his/her house.
2. At Christmas, Johnny/Susie got a new toy house that he/she wanted.
3. Johnny/Susie worked hard on a picture and showed it to his/her father. His/her father really liked it and said Johnny/Susie did a good job.
4. Johnny/Susie went to the zoo, and his/her aunt bought him/her a real nice balloon that he/she liked a lot.
5. It is Johnny's/Susie's birthday. He/she is given a party with lots of cake and fun games to play, and presents, too.

Sad

1. Johnny/Susie and his/her little sister have a pet dog. The dog is sick and going to die.
2. Johnny's/Susie's friend, who he/she really liked to play with, moved away. Johnny/Susie couldn't play with his/her friend any more.
3. Johnny/Susie was the only one in class not to get any Valentines on Valentine's Day.
4. Johnny/Susie couldn't play a game, and some of the kids laughed at him/her.
5. Johnny's/Susie's favorite sweater that he/she liked a lot was very old and worn out. He/she had to throw it away and gave it to his/her mom to get rid of it.

Disgusted

1. Someone threw up on Johnny/Susie during lunch at school.
2. A friend gave Johnny/Susie an apple. Johnny/Susie bit into the apple and found a smelly, squashed, dead worm.
3. Johnny's/Susie's friend brought his dog over to Johnny's/Susie's house. The dog made a mess on the carpet and Johnny/Susie stepped in it.
4. Johnny/Susie went to a movie with a friend. In the movie, people were eating bugs and worms.
5. Johnny/Susie saw a friend who had a baloney sandwich with chili on it. He/she thought it was ugly and would taste terrible.

Afraid

1. Johnny/Susie was dreaming about a monster in his/her nightmare.
2. Johnny/Susie and his/her little sister were in their room at night. It was dark, and they saw a tree outside that looked like a person with his hand about to come in the window.
3. When Johnny/Susie went to bed, he/she thought there was something in his/her closet trying to get him/her.
4. Johnny/Susie was walking in the woods and met a hungry bear who liked to eat little children.
5. A bad man was chasing after Johnny/Susie.

Angry

1. Johnny's/Susie's little brother broke his/her favorite toy on purpose.
2. Johnny/Susie was trying to tell his/her mom about something exciting, but his/her little brother kept interrupting.
3. Johnny/Susie let his/her best friend use his/her new ball. His/her friend wasn't careful and lost the ball and wouldn't give Johnny/Susie another one.
4. Johnny/Susie's friend gave him/her a present because Johnny/Susie helped him with his homework. Later, Johnny's/Susie's friend changed his mind and took the present back.
5. Johnny/Susie made his/her dad an ashtray for his birthday. Johnny/Susie told his/her baby brother not to touch it, but his/her brother did, and the ashtray broke.


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