A Developmental-Interactionist theory of motivation, emotion, and cognition: Implications for understanding psychopathology

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Developmental-Interactionist theory defines motivation as potential for behavior built into a system of behavior control; emotion as the readout of that potential when aroused by a challenging stimulus; and cognition as knowledge: of terrestrial events, of other creatures, of internal bodily processes. Knowledge is both direct, immediate knowledge-by-acquaintance and knowledge-by-description that reflects information processing. Biologically based motivational-emotional systems, which are special-purpose processing systems (SPPSs) structured over the course of phylogeny, interact with general-purpose processing systems (GPPSs) structured by individual experience during ontogeny, producing three sorts of emotional readout: bodily homeostasis and adaptation involving the endocrine and autonomic nervous systems (Emotion I); spontaneous communication involving expressive displays and preattunements to those displays (Emotion II); and subjective experience involving central neurochemical systems (Emotion III). The child learns about subjective experience — labels, display rules — in an emotional education process involving spontaneous communication: the result is a greater or lesser degree of emotional competence. Studies of spontaneous communication include initial studies with rhesus monkeys by R. E. Miller and colleagues in the 1960s, and studies of adults, children, and patient groups using the slide-viewing technique. One result of these studies is evidence that psychopathology is associated with disruptions of emotional communication, leading to a lack of emotional competence. Psychotherapy is seen as a way of increasing emotional competence via emotional reeducation.

Key words: Emotion, cognition, communication, psychopathology, schizophrenia.

This paper begins with an overview of central concepts of a Developmental-Interactionist theory of motivation, emotion, and cognition (Buck, 1991; 1994a). It then turns to a review of a research program on the spontaneous expression and communication of emotion that suggests how the interaction between innate factors and learning occurs in a developmental context; and it concludes with a discussion of the implications of emotional education and the attainment of emotional competence for psychopathology and psychotherapy.

A Developmental-Interactionist Theory of Motivation, Emotion, and Cognition

The Cognitive-Physiological Interaction

Like the Schachter and Singer (1962) self-attribution theory of emotion, Developmental-Interactionist theory conceives
emotion in terms of an interaction between “physiological” factors and analytic cognition. In the self-attribution theory, undifferentiated physiological arousal provides the quantitative aspect of emotion, and cognitive labels and interpretations of that arousal are responsible for the qualitative aspect. We now know that the physiological side of emotion is not undifferentiated, and that in fact the body provides structured and meaningful qualitative information to the organism (Buck, 1993). We also now better appreciate that this interaction occurs in a developmental context, which was not considered in detail by self-attribution theory.

In Developmental-Interactionist theory, the physiological side of the interaction involves biologically based primary motivational-emotional systems, or Primes. These are special-purpose processing systems (SPPSs) structured over the course of phylogeny to serve specific functions: they are phylogenetic adaptations, that is, they are “innate.” The analytic-cognitive side of the interaction involves general-purpose processing systems (GPPSs) evolved to be shaped by the individual organism’s experiences with reality, which are structured by individual experience involving conditioning, instrumental learning, and higher-order cognitive processing over the course of ontogeny. SPPSs and GPPSs are seen to be two of the three general sorts of systems that control human behavior. The third kind of system is unique to human beings: it is linguistic competence that involves formal ways of processing information, including language, mathematics, symbolic logic, music, and dance notation.

Defining Motivation, Emotion, and Cognition

Motivation, emotion, and cognition are basic concepts of psychology, but rarely are defined explicitly. Developmental-Interactionist theory suggests that, to define one of these terms, one must define all three. Motivation is defined as potential for behavior built into a system of behavior control; emotion as the manifestation or readout of that potential when aroused by a challenging stimulus. Thus motivation and emotion are two sides of the same coin: a motivational-emotional system. Cognition is knowledge: of terrestrial events, of other creatures, of internal bodily processes. Knowledge is a result of the actions of motivational-emotional systems, both direct, immediate know ledge-by-acquaintance, and analytic knowledge-by-description or knowledge ABOUT knowledge, that reflects information processing (See Figure 1).

The relationship of motivation and emotion is seen to be analogous to the relationship of energy and matter in physics: energy is potential, as a weight raised to a height or a coiled spring, that is never observed. Instead, we see in matter the manifestation of energy: in heat, light or force. Just so, we never observe motivation: rather we observe in emotion the readout of motivational potential. For example, the knee-jerk reflex is a monosynaptic spinal reflex in which the motivational potential is inherent in the arrangement of sensory and motor nerve cells going between the knee and the spinal cord. The potential is manifested with the neurologist’s tap on the knee: the knee jerk is a readout of the motivational potential. But does this mean
DEVELOPMENTAL-INTERACTIONIST THEORY

**Motivational-Emotional System**

**Readout Source**

**MOTIVATION**
Potential for behavior inherent in neurochem systems (PRIMES)

**Readout Target**

**Emotion I**
Autonomic/endocrine/ immune system responding

**Readout Process**

**EMOTION**
Realization of motivational potential when activated by challenging stimuli

**Readout function**

**Emotion II**
Expressive behavior

**Emotion III**
Subjective experience

**Self-regulation**

**Social coordination**

**Adaptation/homeostasis**

**COGNITION:** Knowledge of terrestrial events, of other organisms, of self.

**KNOWLEDGE BY ACQUAINTANCE:** Direct, immediate self-evident awareness.
(James J. Gibson's direct perception).

**KNOWLEDGE BY DESCRIPTION:** Knowledge ABOUT knowledge, learned by experience. Propositional. (Jean Piaget's equilibration process).

*Figure 1.* The readout model of motivational-emotional systems.

that the knee-jerk reflex involves a motivational-emotional system, and that the reflex itself is an emotion? Yes: this is perhaps one of the most controversial aspects of Developmental-Interactionist theory, for it considers relatively simple reflexes to constitute "emotional" phenomena.

**The Primes**

Developmental-Interactionist theory views the biologically-based SPPSs or Primes to be arranged in a hierarchy, in which the interaction with GPPSs becomes more important as one goes up the hierarchy (Buck, 1985). The simplest sorts of Primes are reflexes like the knee-jerk reaction: here the response is wholly "hard-wired" and innate, with no flexibility. The next point on the hierarchy involves fixed action patterns or *instincts*, such as those that motivate the homing and migration migrations of birds and fish. These can involve complex patterns of behavior which are quite inflexible when examined closely: one cannot teach a salmon to change its migratory behavior. The next level of the Primes does, however, involve flexibility. *Drives* involve bodily needs that are signaled to the organism by subjectively experienced *affects*: feelings and desires (Buck, 1993). The organism is signaled that it is hungry, or thirsty, or cold, or in pain by specific bodily messages. These serve to generally activate behavior so that the organism begins to explore its surroundings. If the organism is successful in finding food, water, or other resources that satisfy its needs, the behavior leading to the reward will be reinforced so that in the future when similar needs arise the organism is "steered" to the goal. The drives involve specific bodily needs and consummatory behaviors that function to satisfy those needs.

The next level of the hierarchy does not involve specific needs or consummatory behaviors. This is the level of the primary *affects* of Tomkins (1962/1963), Ekman (1994; Ekman & Friesen, 1969) and Izard (1992; 1994): happiness, sadness, fear, anger, surprise,
and disgust. These signal the bodily state and leave the behavior up to the individual. The individual knows that he or she is happy, or angry; and may or may not know why; but unlike some theorists we do not believe that any specific behavior tendencies are activated. Instead, the individual has a choice about what to do, and if for example anger is felt toward a large person or a small person the behavior will be different.

We can see that as we have gone up the hierarchy from reflexes, to instincts, to drives, to affects, the interaction between SPPSs and GPPSs has increasingly favored the latter. Arguably, the resulting dimension presented in Figure 2 more accurately reflects the relationship between innate factors and learning than does the more usual categorical distinction between “emotion” and “cognition.” Also, other phenomena may be meaningfully placed on this dimension. For example, the dimension can mirror the phylogenetic scale, with simple creatures’ behavior being mostly a matter of reflexes (ants and bees, for example) and creatures with significant analytic-cognitive capacities being at the other extreme: this progressive evolution of learning and cognitive abilities that confer increased behavioral plasticity has been termed anagenesis (Gottleib, 1984). Also, the developmental scale may be represented, with the mostly hard-wired infant at the left and the adult at the right.

Three Sorts of Readout
As Figure 1 illustrates, emotion is seen as having three sorts of readout serving three distinct function: bodily homeostasis and adaptation via the endocrine and autonomic nervous systems (Emotion I); social regulation via spontaneous communication involving expressive displays and pre-attunements to those displays (Emotion II); and self-regulation via subjectively experienced affects involving central neurochemical systems (Emotion III).

Accessibility. A fundamental proposition

Figure 2. Interaction of special-purpose processing systems (biogenetic factors) and general-purpose processing systems (learned factors.)
DEVELOPMENTAL-INTERACTIONIST THEORY

of Developmental-Interactionist theory is that the three readouts are differentially accessible to the individual and to others. Subjectively experienced affect is accessible directly only to the self: others never know exactly how we feel. Expressive behaviors are most accessible to others: we cannot see our faces or bodies, or hear our voices as others do. Finally, most homeostatic-adaptive responses are normally not accessible at all without special equipment (See Figure 3). Due to this difference in accessibility, the social learning process underlying emotion must be distinct (Buck, 1983). In ordinary social learning, as when a child learns to label the color "blue," the referent for the label is equally accessible to the child and the parent. The parent refers to the sky as "blue" and the water as "blue," as well as labeling blue objects, so that the child soon gets the idea and there are few misunderstandings. In contrast, the parent never knows exactly how the child feels.

*Emotional education and emotional competence.* One way of learning about one's feelings and desires is through social biofeedback involving the other's response to expressive behavior on the part of the child (See Figure 3). If the child knits its brows, screams, and throws things the parent might conclude that the child is angry. The parent might say: "You are angry, but you'd better not throw things! Go to your room and relax!" Alternatively, the parent may yell "You are bad!" and hit the child. The first response gives the child information about how the subjective experience of anger is labeled, and what is considered an appropriate and inappropriate way to act when this experience occurs: the second does not. In the first example this emotional education process may foster the ability effectively to label and appropriately express one's feelings and desires: emotional competence. In the second case, no such tuition takes place. The child's learning from these responses illustrate *emotional education* that

![Figure 3 The readout model and emotional education: The social biofeedback process.](image-url)
may or may not result in emotional competence: the ability effectively to label and appropriately express one's feelings and desires.

This way of learning about one's feelings and desires is termed social biofeedback because the parent's response to the child's expressive behavior is like a biofeedback signal in that it gives the child information about a process that is otherwise inaccessible: the child's own Emotion II expressive readout (Buck, 1988). One of the consequences of successful emotional education and emotional competence is that children learn to label and describe their feelings; conversely, one possible consequence of unsuccessful emotional education is a condition termed by Nemiah and Sifneos (1970) alexithymia, or "no words for mood:" the individual is unable to label and describe his or her feelings in words.

The emotional education process in which the child learns about subjective experience — labels, display rules — resulting in a greater or lesser degree of emotional competence, involves emotional communication. The next part of this paper reviews studies of emotional communication, including initial studies with rhesus monkeys by R. E. Miller and colleagues in the 1960s, and studies of adults, children, and brain-damaged patients. It then reviews the conceptualization and definition of "spontaneous communication," and considers recent studies of emotional communication in samples of behaviorally-disordered children and schizophrenic patients.

Studies of Emotional Communication

The Co-operative Conditioning Technique

The studies to be described use a slide-viewing technique (SVT) derived from the co-operative conditioning technique developed by Robert E. Miller to measure the communication of affect in rhesus monkeys (Miller, Banks, & Ogawa, 1963). Miller first taught two monkeys to press a bar to avoid shock or obtain food reward. He then paired the animals so that one, the "sender," could see the light but not press the bar. The second, "receiver" monkey in another room had the bar but not the light. The receiver was however provided with the televised image of the head of the sender. Miller reasoned that, if the sender made expressive displays to the light, and if the receiver perceived and correctly interpreted that display, then the receiver could press the bar which would avoid the shock, or obtain the food reward, for both animals. Miller found that normal rhesus monkeys were quite proficient at this task, although animals who had been isolated from other monkeys for the first year of life could neither send nor receive accurately in the communication situation (Miller, Caul & Mirsky, 1967).

The Slide-Viewing Technique

Studies with adults. Buck, Savin, Miller & Caul (1972) developed a version of the co-operative conditioning technique for human subjects. Emotionally-loaded color slides were employed as stimuli. The slides were not designed to elicit pure primary emotions — arguably that is impractical — but rather to elicit distinct and reasonably strong blends of emotion. Senders were told that the purpose of the study was to compare their subjective verbal report of their emotional experiences with their physiological responses, and heart rate and skin conductance electrodes were applied.
Senders sat alone in a room and viewed each slide on a back-lighted screen for ten seconds, when a signal light was turned on. They were instructed to then describe the subjective experience that the slide evoked. After the light and slide were turned off, the sender was asked to rate his or her emotional experience along a scales from unpleasant to pleasant. There were five categories of slides: SEXUAL, SCENIC, PLEASANT PEOPLE, UNPLEASANT, and UNUSUAL. Unknown to the senders, their facial expressions and gestures were filmed by a hidden camera. Receivers viewing the senders guessed on each trial what kind of slide the sender had viewed and how pleasant their emotional response has been. This procedure yielded two communication accuracy measures: the percentage of slides correctly identified and the correlation coefficients between the sender’s and receivers’ ratings of pleasantness over the 25 slides.

Results indicated significant communication accuracy on both measures for both male and female senders, with significant sex differences as well showing women to be better senders (See Table 1). Moreover, more accurate senders showed fewer skin conductance deflections and smaller heart rate responses to the slides (Buck et al., 1972; Buck, Miller & Caul, 1974). This finding parallels the distinction between externalizing and internalizing modes of emotional response found by H.E. Jones in the Berkeley Growth Study conducted in the 1930s (Jones, 1935; 1960), and agrees with the more recent work of Kagan on the physiological effects of inhibition (Kagan et al., 1984). Men tended to show internalizing and women externalizing patterns of response.

<table>
<thead>
<tr>
<th>Group</th>
<th>Percent Correct</th>
<th>Pleasant-Unpleasant</th>
<th>r</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data from Buck et al., 1972; 1974.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adult females</td>
<td>35%a</td>
<td>+.42a</td>
<td></td>
</tr>
<tr>
<td>Adult males</td>
<td>28%b</td>
<td>+.25b</td>
<td></td>
</tr>
<tr>
<td>Data from Buck, 1975; 1977.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Girls</td>
<td>38%a</td>
<td>+.44a</td>
<td></td>
</tr>
<tr>
<td>Boys</td>
<td>37%a</td>
<td>+.30a</td>
<td></td>
</tr>
<tr>
<td>Undergrad. receiving</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Girls</td>
<td>37%a</td>
<td>+.25a</td>
<td></td>
</tr>
<tr>
<td>Boys</td>
<td>31%b</td>
<td>+.22b</td>
<td></td>
</tr>
<tr>
<td>Data from Buck &amp; Duffy, 1980.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LHD aphasic</td>
<td>47%a</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comparison patient</td>
<td>42%a</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RHD patient</td>
<td>34%a</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Parkinson's disease</td>
<td>30%b</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: For each comparison within a column, cells with subscripts in common are not significantly different from each other (p<.05).

a Percent correct chance =20%. N=46 females, 45 males.
b Percent correct chance =25%. N=11 girls, 18 boys.
c Percent correct chance =25%. N=8 LHD, 10 Comparison, 10 RHD, 9 Parkinson’s Dis.

Studies with children. The next step was to investigate sex differences and physiological responding in preschool children (Buck, 1975; 1977). The child sat beside an experimenter who also watched the slides. The children watched four kinds of slides. A new slide category was FAMILIAR PEOPLE, which were slides of the child and his or her friends and teachers. This proved to be an excellent slide category, as it was strongly arousing and yet positive. The other slide categories were UNFAMILIAR PEOPLE, MILDLY UNPLEASANT, and UNUSUAL. After each slide, the experimenter asked the child to rate how pleasant or unpleasant it was by pointing to one of a
series of simple faces. The child's mother watched via a hidden camera and made ratings from another room. Later, videotapes of the children's expressions were rated by college students.

Results indicated significant communication vis à vis both the mother and students, but not the strong sex difference in sending accuracy found with adults. There were however large individual differences in the expressiveness of the children, which was related to skin conductance responding as found previously, with more expressive children showing fewer skin conductance responses.

The children's expressiveness in the study was related to teacher's ratings of the children's expressiveness in the preschool.

The results to date were consistent with a view that facial/gestural expressiveness is based in part upon temperament (given the large individual differences in young children) and in part upon social learning (given the sex difference in adults but not children). More specifically, six major conclusions were drawn from the studies of adults and children: (1) statistically significant communication accuracy was demonstrated, (2) there were large individual differences in sending accuracy related to sex, personality, and physiological measures, (3) in contrast, individual differences in receiving ability were small and inconsistent, (4) female adults were better senders than males in American college students, (5) accurate senders showed smaller autonomic responses than less accurate senders (the number of skin conductance deflections and heart rate acceleration), and (6) children did not manifest the sex difference in sending accuracy but did show individual differences in sending accuracy related to skin conductance deflections and teachers' ratings of expressiveness.

Study with brain damaged patients. The next major step was to employ the SVT to investigate nonverbal communication in brain-damaged patients. This was of interest because of the tragic impairment of verbal communication caused by strokes that damage the left hemisphere (LH) of the brain. There was interest in determining whether such deficits could be mitigated by the use of nonverbal communication. To this end, an aphasiologist at the University of Connecticut, Robert J. Duffy, has been studying the use of pantomime by aphasic patients, and in the process developed tests of pantomimic ability: the Pantomime Recognition Test (PRT) and Pantomime Expression Test (PET). In the PRT, the experimenter pantomimes the use of a common object (a drinking glass, a pair of scissors), and then asks the patient to point to a picture of the object. In the PET the patient is asked to pantomime using a common object. Unfortunately, it was found that aphasic patients could perform the task only if they had surviving verbal abilities (Duffy & Duffy, 1981).

The pantomimic tasks of the PET and PRT are indeed nonverbal in a sense, but they are also intentional: there is an intention to send a specific message or proposition. The SVT in contrast involves unintentional expressive behavior, because the camera is hidden and the subject is engaged at a task that does not require communication. For this reason Buck and Duffy (1980) studied aphasic patients, using as comparison groups patients with right hemisphere brain damage (RHD) in whom verbal abilities are...
essentially intact, patients with Parkinson's disease (PD) in which a lack of facial expression is a common symptom due to subcortical motor system dysfunction, and patients with no apparent brain damage. The slide categories included FAMILIAR pictures, although it was found in pilot testing that elderly patients tended to have negative responses to pictures of themselves: therefore pictures of people known to the patients, such as the nurses on their ward and personnel on the recreation staff, were used. The other slide categories were SCENIC, UNPLEASANT and UNUSUAL. The patients were videotaped and later observed and rated by student receivers.

Results indicated that, among the LHD patients, the PET and PRT were both strongly intercorrelated — in the 90s — with each other and with a common measure of aphasic impairment: the Porch Index of Communicative Ability (PICA). However, none of these measure was correlated significantly with sending accuracy as measured by the SVT: indeed, all of the correlations were zero or close to it (Duffy & Buck, 1979). Apparently two sorts of communication systems are involved here and are essentially unrelated to one another. Moreover, LHD aphasic patients, who could not communicate verbally, were actually the best overall senders in the study and they were significantly better than RHD and PD patients on the communication accuracy measure. They were also rated to be more expressive.

Finally, the pattern of sending accuracy across slide categories was of interest. The PD, RHD, and non-brain-damaged comparison patients all showed a pattern of being most expressive on the FAMILIAR slides and least expressive on the UNPLEASANT. In this regard these elderly male patients were remarkably similar to normal preschool children. In contrast, the aphasic patients showed a similar pattern across slide categories: they were slightly less expressive on the FAMILIAR slides and more expressive on the UNPLEASANT slides compared with non-brain-damaged patients. This pattern suggested that LHD patients may be less affected by display rules that, in U. S. culture, tend to allow and even encourage expression when viewing a familiar friend but discourage expression to negative stimuli (See Ross, Homan & Buck, 1994).

These data suggested that (1) the distinction between "verbal" and "nonverbal" expression does not capture the differences between LH and RH functioning. (2) instead, there are two simultaneous "streams" of communication, one of which is intentional and symbolic, the other of which is nonintentional, or spontaneous; (3) the intentional communication stream is disrupted by LHD, producing aphasia, or what following Finklnberg (1870) might be more generally termed "asymbolia" (Duffy & Liles, 1979); (4) the nonintentional stream is disrupted by RHD, producing what might be termed "aspontania;" (5) LHD but not RHD may also produce a failure to follow "display rules" which differentiate between familiar slides, where expressiveness is encouraged in U. S. culture, and unpleasant slides where expressiveness is less appropriate. From these data, a model was developed in which the two simultaneous streams of communication posses the characteristics shown in Figure 4.
Figure 4 Characteristics of spontaneous and symbolic communication.

Spontaneous versus Symbolic Communication

As Figure 4 indicates, symbolic communication is communication in its usual, verbal/linguistic sense: it is based upon codes that must be learned by both sender and receiver; these codes involve symbols which bear an arbitrary relationship with the referent; it must be intentional at some level; its statements are propositions capable of logical analysis; it is based upon LH processes (Buck, 1994b). Spontaneous communication in contrast is biologically based upon innate phylogenetically structured displays on the part of the sender and preattunements to those displays on the part of the receiver; the displays are signs of the referent, or externally accessible aspects of the referent (as in “dark clouds are a ‘sign’ of rain”); it is spontaneous or nonintentional, its statements are nonpropositional, since they cannot be false (if the sign is present the referent must be present by definition); and it is based upon RH processes involving the expressive display of emotion (Emotion II). The spontaneous display is of course influenced by learned display rules (associated with the LH) that tend to control spontaneous expression for strategic purposes. This general view of the emotion communication process was presented in The Communication of Emotion (Buck, 1984).

Expressiveness and Communication Accuracy in Psychopathology

Our more recent studies have involved studying the implications of emotional education for psychopathology (Buck, Goldman, Easton & Norelli Smith, in press). In normal samples, children who show less sending accuracy appear to be underexpressive. However, studies of clinical samples find that low sending accuracy may at times be associated with over-expressiveness. Specifically, Cheryl Goldman’s doctoral dissertation compared the emotional expressiveness and communication accuracy of behaviorally-disordered
(BD) children aged 8–13 with age-matched comparison children (Goldman, 1993). Also, Caroline Easton’s dissertation analyzed emotional expression and communication in schizophrenic patients (Easton, 1994).

Expressiveness in behaviorally-disordered children. In Goldman’s (1993) study, 30 BD children were compared with age-matched comparison children with the slide-viewing technique. Children viewed FAMILIAR pictures of themselves and their teachers, SCENIC pictures of pleasant landscapes, UNPLEASANT pictures, and UNUSUAL pictures. After each slide, the children rated how happy, sad, afraid, angry, surprised, and pleasant or unpleasant the slide made them feel. Unknown to them, they were videotaped by a hidden camera as they viewed the slides. Later, judges guessed what kind of slide the child watched and how the child felt about the slide using the same scales used by the child. Measures of communication accuracy included the percent of slides correctly categorized and the correlations for each of the emotions computed across the slides viewed.

Results showed that BD children did not rate their feelings differently from the comparison children: in no case was there a significant in self-ratings (see Table 2). This is important, for it implies that the BD children attended to the slides and processed their meaning. Despite the similarities in self-ratings, results indicated that the BD children were poorer senders, both in terms of the percent of slides categorized and the emotion correlations. The comparison children were better senders on all of the communication scores. Furthermore, all of the communication scores were significantly different from zero, with the exception of the emotion correlation score of anger for the BD children: apparently judges were not able to tell whether these children were angry or not. This is particularly significant because it was also found that the anger communication score was the only communication score significantly related to measures of social competence: socially competent children communicated their anger, less competent children did not.

Despite the fact that the BD children were poorer senders, they did not appear to be less expressive than the comparison children. Instead, they appeared to show complex, inconsistent patterns of expression. This was particularly apparent when the children viewed pictures of themselves. The BD children rated their feelings toward the slides showing themselves as very positive, and not significantly different from the similar ratings on the part of the comparison subjects. In contrast, the raters rated the expressive behaviors of the BD children when they viewed themselves as significantly less happy and pleasant, and more sad, afraid, and angry, compared with the other children. The BD children did smile when viewing their own pictures, but also showed facial expressions suggesting negative emotions, including disgust. Thus there is an interesting discontinuity between the ratings of the BD children, which are similar to those of the comparison children; and their expressive behaviors, which are rated to be more negative. The negative expressions might be an unobtrusive indication of negative self-esteem on the part of the BD children that is not admitted openly.

Expressiveness in schizophrenic patients. This pattern of reduced sending accuracy
among the clinical sample and a discontinuity between ratings and expressive behaviors was also observed with schizophrenic patients. Easton (1994) studied the expressive behaviors and ratings of adult schizophrenic patients, depressed patients and adult comparison patients using procedures and slides similar to those used by Goldman (1993).

Results indicated that the schizophrenic patients rated their own feelings on most slide categories (Scenic, Unpleasant, Unusual) similarly to the comparison subjects. This was significant in that it showed that the patients must have attended to and correctly processed the emotionally-loaded slides. However, like the BD children the schizophrenic patients appeared to be more negative to the judges. Significantly, the schizophrenic patients rated their own picture as quite negative, suggesting that their low self esteem is not hidden. Also like the BD children, the schizophrenic patients were significantly poorer senders on both the percent correct measure and all of the emotion correlation measures (see Table 2).

**Conclusions.** The data from the BD and schizophrenic samples show similar patterns: (1) self-reported emotional ratings in the clinical samples is more like those of comparison subjects than is expressive behavior; (2) expressive behavior is rated by others to be more negative in the clinical samples; (3) sending accuracy is lower in clinical samples, and (4) responses in the clinical samples to pictures of the self is particularly negative. These findings suggest that a deeper understanding of emotional expression and communication, and in particular of the emotional education process, is necessary for the understanding of the development of psychopathology.

**Emotional Communication, Emotional Education, and Alexithymia**

Thus, clinical samples show a pattern of low sending accuracy combined, not necessarily with a lack of expressiveness, but with complex and primarily negative emotional expressions which do not match

### Table 2

**Communication accuracy scores in behaviorally-disordered children and schizophrenia patients**

<table>
<thead>
<tr>
<th>Group</th>
<th>% Correct</th>
<th>Happy r</th>
<th>Sad r</th>
<th>Fear r</th>
<th>Anger r</th>
<th>Surprise r</th>
<th>Pleas-Unpl r</th>
</tr>
</thead>
<tbody>
<tr>
<td>BD</td>
<td>44%&lt;sup&gt;a&lt;/sup&gt;</td>
<td>+.39&lt;sup&gt;a&lt;/sup&gt;</td>
<td>+.30&lt;sup&gt;a&lt;/sup&gt;</td>
<td>+.36&lt;sup&gt;a&lt;/sup&gt;</td>
<td>+.14&lt;sup&gt;a&lt;/sup&gt;</td>
<td>+.24&lt;sup&gt;a&lt;/sup&gt;</td>
<td>+.35&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Comparison</td>
<td>60%&lt;sup&gt;b&lt;/sup&gt;</td>
<td>+.54&lt;sup&gt;b&lt;/sup&gt;</td>
<td>+.53&lt;sup&gt;b&lt;/sup&gt;</td>
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<td>+.51&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Schizophrenia</td>
<td>34%&lt;sup&gt;a&lt;/sup&gt;</td>
<td>+.18&lt;sup&gt;a&lt;/sup&gt;</td>
<td>+.23&lt;sup&gt;a&lt;/sup&gt;</td>
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<tr>
<td>Comparison</td>
<td>44%&lt;sup&gt;b&lt;/sup&gt;</td>
<td>+.48&lt;sup&gt;b&lt;/sup&gt;</td>
<td>+.32&lt;sup&gt;b&lt;/sup&gt;</td>
<td>+.20&lt;sup&gt;b&lt;/sup&gt;</td>
<td>+.25&lt;sup&gt;b&lt;/sup&gt;</td>
<td>+.21&lt;sup&gt;b&lt;/sup&gt;</td>
<td>+.33&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

*Note. % Correct chance =25%. For each comparison within a column, cells with subscripts in common are not significantly different from each other (p<.05). Effect sizes contrasting the communication accuracy of the behaviorally-disordered and comparison children in the Goldman study were .56 for the percent correct measure and .44 for the emotion correlation measures. In both studies, comparison group > patients overall on the emotion correlation measures (p<.05).*

<sup>a</sup>30 BD, 30 matched comparison children, aged 8-13 (25 boys and 5 girls within each group).

<sup>b</sup>20 schizophrenic patients (9 female, 11 male) mean age 35.8 yr, 12 comparison adults (6 female 6 male) mean age 33.0 years.
with self-rated emotion. Apparently both BD children and schizophrenic patients attend to and perceive emotionally-loaded slides normally, and know what feelings such slides should evoke and how to rate their feelings accordingly, but their expressive behaviors do not match these rated emotions. We do not know what they “really” feel, of course, but the fact that they rate their feelings to the slides appropriately suggests that their higher-order analytic-cognitive responses to events do not pose a principal problem. Rather it is their emotional responses that are disorganized: their expressive behaviors do not match their ratings. This emotional disorganization may be a result of a deficit of emotional education which, in turn, is a result of disrupted emotional communication. The problems in emotional communication, in turn, may be exacerbated by patterns of under-or over-expressiveness on the part of the child.

We have suggested that emotional education is an aspect of emotional development unique to human beings, where one’s biologically-based subjective experience of feelings and desires is linked with culturally variable linguistic labels and rules. Emotional education occurs through emotional communication: it is necessary for children to communicate accurately their feelings to socialization agents for proper social biofeedback to occur. Extremes of expressiveness on the part of the child — either too little expression or too much, disorganized, expression — makes it difficult for the socialization agent to understand the child’s “true feelings” and to give effective feedback. As a result, the child

![Diagram of Emotional Education and Expressiveness](image-url)

**Figure 5** Relationships between expressiveness, communication, emotional education/competence, and alexithymia.
does not learn culturally appropriate labels, explanations, and display rules: does not become *emotionally competent*. One result may be an inability to talk about feelings and desires, Nemiah and Sifneos’ (1970) alexithymia. Inexpressive alexithymia results from a deficit of expressiveness on the child’s part; expressive alexithymia results from a surfeit of expressiveness.

This suggests that sending accuracy is best at moderate levels of expressiveness, and that for this reason emotional education and the attainment of emotional competence are easiest at those moderate levels (See Figure 5). Conversely, the inability to label and describe one’s feelings — alexithymia — should be greatest at the extremes of high and low expressiveness, resulting in expressive and nonexpressive alexithymia, respectively. Low levels of expressiveness are associated with high levels of inhibition, high fight-or-flight responding (as measured by skin conductance deflections, for example), and introverted or externalizing temperament and a tendency toward inhibitory psychopathology; conversely high levels of expressiveness are associated with the opposite pattern of response.

A lack of emotional competence may also stem from failure on the part of the socialization agent to be attentive or to respond appropriately to the child. Thus even an appropriately expressive child may lack proper feedback from others if he or she is raised in a neglectful environment, and an abusive environment may produce pathological patterns of emotional education that can carry on for generations. A pathological environment may disastrously influence even the most hardy individual, while an emotionally nurturing environment may protect even those most at risk. In a sense, creating such a nurturing environment, inspiring *emotional reeducation*, is at the essence of psychotherapy.

**References**


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Author Notes

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