

First Words

Between 12 and 18 months of age **words** emerge as more salient than gestures as a way to refer to objects (Namy & Waxman, 2002). Around the age of 8 months, infants understand the meanings of some individual words and phrases. This ability to understand words, called **receptive language**, precedes **language production**, the ability to produce spoken words and phrases. You can direct a baby's glance by saying, "Look at the flowers," or "Do you want candy?" At this age, babies can go through their paces in the ever delightful game of "point to your nose, eyes, ears," and so on. The number of words infants understand increases rapidly after 12 months. According to one analysis, 16-month-olds have a receptive vocabulary of between 92 and 321 words (Fenson et al., 1994).

One of the first significant events in the development of language production is the *naming* of objects. With repetition, a sound or word becomes associated with a specific object or a set of related objects. For example, a child may say *ba* whenever she sees her bottle. If she is thirsty and wants her bottle, she may try saying *ba* in order to influence her caregiver to produce the bottle. Gestures, actions, and facial expressions often accompany the baby's word, which help establish its meaning in the caregiver's mind. If the baby's word has meaning to the caregiver and serves to satisfy the baby's needs, it will probably be retained as a sign. The word *ba* may come to mean "bottle" and other liquids such as juice, water, or milk.

The important characteristic of **first words** is their shared meaning. Even though *ba* is not a real word, it functions in the same way that any noun does—it names a person, place, or thing. These single-word utterances accompanied by gestures, actions, vocal intonation, and emotion are called **holophrases**. They convey the meaning of an entire sentence. For example, saying "ba, ba" in a pleading tone while pointing to the refrigerator and bouncing up and down conveys the meaning "I need a bottle," or "Get me the bottle." Gradually, the child discovers that every object, action, and relationship has a name. Rapid progress occurs between 12 and 16 months in the naming of objects. By 16 months a typical infant has a productive vocabulary of 26 words. Table 5.5 provides a summary of milestones in language over the first 18 months of life.

Young children first talk about what they know and what they are interested in. Common first words include important people

(*Mama, Dada*, names of siblings), foods, pets, toys, body parts (*eye, nose*), clothes (*shoe, sock*), vehicles (*car*), favorite objects (*bottle, blanket, phone*), other objects in the environment (*keys, trees*), actions (*up, bye-bye, yes, no, please, down, more*), pronouns (*you, me*), and states (*hot, hungry*). One hypothesis is that first words are those that are rich with imagery. Whether words are nouns or verbs is not as important as whether an infant has been able to form a mental representation of what the word refers to (McDonough, Song, Hirsha-Pasek, Golinkoff, & Lannon, 2011). Lois Bloom (2004) has suggested that a "principle of relevance" guides the early acquisition of new words. Babies pay special attention to words and expressions that are most closely linked with what they are doing and thinking about at the time. For that reason, the actual vocabulary that is acquired during infancy is quite idiosyncratic, reflecting the themes and experiences of each child's everyday life (Polka, Rvatchew, & Mattock, 2009).

FURTHER REFLECTION *Analyze the role of gestures in early communication. What is the importance of gestures? How do they contribute to the establishment of intersubjectivity? How much and in what contexts do you continue to rely on gestures to convey meaning?*

Attachment

OBJECTIVE 5 Analyze social attachment, the process through which infants develop strong emotional bonds with others, and describe the dynamics of attachment formation during infancy.

Have you ever wondered how feelings of love and connectedness form between babies and their caregivers? At birth, an infant has some familiarity with the sound and rhythm of the mother's voice, but a newborn does not show evidence of a specific emotional preference for the biological mother over other responsive adults. By the end of the first year of life, however, babies not only know their caregivers but also have very strong emotional preferences for these adults over all others. **Attachment** is the process through which people develop specific, positive emotional bonds with others. John Bowlby proposed the notion



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Close physical contact during nursing provides infants with a combination of sensory stimuli—sight, sound, smell, and touch—that contribute to the formation of an early scheme for their mother.

of the **attachment behavior system** as an organized pattern of infant signals and adult responses that lead to a protective, trusting relationship during the very earliest stage of development. The nurturing responses of the caregiver form a corresponding behavioral system referred to as **parenting** or **caregiving** (Ainsworth, 1985; Bowlby, 1988).

From ethological and neurobiological perspectives, the coordinated attachment and caregiving systems form a pattern of mutual regulation through which the infant alerts the caregiver to distress, and the caregiver provides protection, comfort, and care. Given the prolonged dependent status of human infants,

this attachment/caregiving system is a foundation of survival. Through repeated sensory, motor, and communication experiences, it creates the embodiment of a social-emotional relational context that is forged and reinforced in the establishment of neural pathways, interconnections, and biochemical processes. These biological and neural responses are associated with threat reduction, comfort or discomfort, and sensitive or insensitive care. Infants' experiences, especially under conditions of threat or distress, set the stage for their own ability to regulate their emotions and to establish significant relationships over the next stages of life (Schorre, 2013).

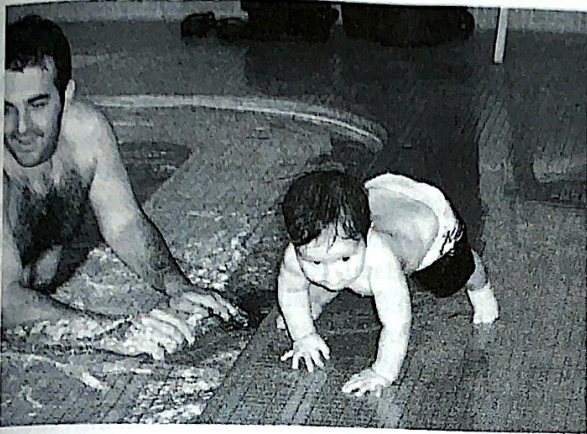
The Development of Attachment

Attachment theorists have described a sequence of stages in the formation of the attachment relationship (Ainsworth, 1973, 1985; Bowlby, 1969/1982, 1988; Marvin & Britner, 2009) (see Table 5.6). Many of the sensory and motor competencies described earlier in this chapter contribute to an infant's ability to establish a vivid mental representation of the primary caregiver and to stimulate caregiving behaviors. During the first 3 months of life, infants engage in a variety of behaviors, including sucking, rooting, grasping, smiling, gazing, cuddling, crying, and visual tracking or following, which serve to maintain closeness with a caregiver or bring the caregiver to the infant. Through these contacts, babies learn about the unique features of their caregivers. Caregivers, for their part, use a variety of strategies including eye contact, touching and holding, and vocalizing as means of establishing and maintaining social engagement with their infants (Akhtar & Gernsbacher, 2008). Caregivers and infants experience repeated interactions that result in the formation of predictable patterns. Rhythmic patterns of interaction lay the foundation for expectations about communication.

From about 3 to 6 months, an infant's attachment is expressed through preferential responsiveness to a few familiar figures. Infants smile more at the familiar person than at a stranger. They show more excitement at that person's arrival and appear to be upset when that person leaves. During this phase, babies initiate more interactions toward the familiar caregiver. They are able to control the interaction by linking a chain of behaviors into a more complex sequence. In Stage 1, for example, the baby may look intently at the primary caregiver. In Stage 2, the baby looks intently, reaches toward the caregiver's face, and pulls the caregiver's hair.

Table 5.6 Five Stages in the Development of Attachment

Stage	Age	Characteristics
1	Birth to 3 months	Infant uses sucking, rooting, grasping, smiling, gazing, cuddling, crying, and visual tracking to maintain closeness with caregivers.
2	3 to 6 months	Infant is more responsive to familiar figures than to strangers.
3	6 to 9 months	Infant seeks physical proximity and contact with objects of attachment.
4	9 to 12 months	Infant forms internal mental representation of object of attachment, including expectations about the caregiver's typical responses to signals of distress.
5	12 months and older	Child uses a variety of behaviors to influence the behavior of the objects of attachment in ways that will satisfy needs for safety and closeness.



With Dad nearby, Jakob can begin to explore this new environment and return to his secure base as needed.

From about 6 to 9 months, babies want to be physically close to the object(s) of attachment. The ability to crawl and to coordinate reaching and grasping contribute to greater control over the outcomes of their actions. In this phase, babies experiment with finding an optimal distance from the caregiver. They may crawl away, look back, and then, depending on the caregiver's perceived availability, crawl back to the caregiver or smile and continue exploring. If the caregiver is preoccupied or out of sight, the baby may cry to bring the caregiver closer or to reestablish contact.

From about 9 to 12 months, babies form mental representations of their caregivers. This mental picture provides the first robust **working model of an attachment** relationship. Specific characteristics of a caregiver and expectations about how the caregiver will respond to the infant's actions are organized into a complex attachment scheme that includes expectations about how the caregiver will respond when the child is frightened, hurt, or distressed.

In toddlerhood and later, young children use a variety of behaviors to influence the behavior of their parents and other objects of attachment in order to satisfy their own needs for closeness. Bowlby described this new and important capacity as the creation of a **goal-corrected partnership**. Children may ask to be read to, cuddled at bedtime, and taken along on errands. These and other strategies produce caregiver behaviors that will satisfy a child's continuing needs for physical contact, reassurance, closeness, and love.

As children get older, they begin to think about new risks and threats to their security. They may initiate new strategies for maintaining closeness to the objects of their attachment. Especially when they are experiencing unusual stress, as in times of illness, divorce, or rejection, children of any age may try to activate the attachment system by sending signals that are intended to evoke the caregiver's comfort and closeness.

Stranger Anxiety

During the second half of the first year, two signs of a child's growing attachment to a specific person are observed: stranger anxiety and separation anxiety. **Stranger anxiety** refers to the baby's discomfort or tension in the presence of unfamiliar

adults. By 6 months of age, most babies can distinguish a picture of their mother from a picture of a stranger (Swingler, Sweet, & Carver, 2010). Babies vary in how they express their protest to strangers and in how intensely they react (Rieser-Danner, 2003). They may cling to their parents, refuse to be held, stiffen at the stranger's touch, or merely avert their eyes from the stranger's face.

The baby's response to a stranger depends on specific features of the situation, including how close the caregiver is, how the stranger approaches the baby, and how the caregiver responds to the stranger. For example, if a mother speaks in a positive tone of voice to her baby about a stranger, the baby's response to the stranger is likely to be positive. In contrast, if the mother interacts with the stranger in a socially anxious manner, the baby will be more fearful of the stranger. This effect is especially notable in infants who are temperamentally more fearful and inhibited (deRosnay, Cooper, Tsigaras, & Murray, 2006).

The baby's response to a stranger will also be influenced by the amount of prior experience with unfamiliar adults. Strangers are more unfamiliar to infants in some cultures and contexts than in others (Rothbaum, Morelli & Rusk, 2011). In some parts of the world, babies rarely come into contact with anyone outside of their small village. In contrast, some children are in child care arrangements where adults frequently come and go. Normally, wariness of strangers is considered a positive developmental sign—that is, babies are able to detect the differences between their parents and adults they do not know. Wariness of strangers continues to be expressed throughout life. In fact, one often sees stronger expressions of suspiciousness or fear among adults encountering strangers than among babies.

Separation Anxiety

At about 9 months, infants give another indication of the intensity of their attachment to their parents. They express rage and despair when their parents leave them. This reaction is called **separation anxiety**. Just as with stranger anxiety, a baby's response to separation depends on the conditions. Infants are less distressed when their primary caregiver leaves them alone in a room at home than when they do so in a laboratory. They are less likely to protest if the caregiver leaves the door to the room open than if she closes the door as she leaves. Separation from the mother for periods of 30 minutes has been identified as a distinct source of stress for babies 9 months of age and older. Neurological and biochemical evidence of stress, including increases in adrenocortical activity and concentrations of cortisol in the saliva, were associated with 30 minutes of separation from the mother in a laboratory situation. The impact of stressful separations can be seen in the disruption of basic physical patterns, especially sleep disturbances, and in regression to more immature forms of play behavior, aimless wandering, and altered interactions with peers and teachers in the child care setting (Coan, 2016).

A baby's responses to separation and reunion have been used as key behavioral indicators of attachment quality. Babies who are described as having an insecure attachment are more distressed when they are separated from their mothers, and the mothers appear to be less responsive in calming their babies following separation (Harel & Scher, 2003).

Over time, most babies become more flexible in response to parents' temporary departures. Young children learn to tolerate brief separations. By the age of 3, children may even look forward to a night with a babysitter or an afternoon at grandfather's house. Once the attachment is fully established, many children can comfort themselves by creating mental images of their parents and by remembering their parents' love for them. During infancy, however, the parents' physical presence remains a focal point of attention and concern.

Formation of Attachments with Mother, Father, and Others

Most infants have more than one caring person with whom they form an attachment. Most commonly, the first object of attachment is the mother, but fathers, older siblings, grandparents, and child care professionals also become objects of attachment. Several factors have been identified as important for predicting which people will form the infant's hierarchy or radius of significant attachment figures (Cassidy, 2016; Howes & Spieker, 2016):

1. The amount of time the infant spends in the care of the person.
2. The quality and responsiveness of the care provided by the person.
3. The person's emotional investment in the infant.
4. The presence of the person in the infant's life across time.

Patterns of Attachment

It is important to distinguish between the presence of an attachment and the quality of that attachment. According to attachment theory, if an adult is present to interact with the infant, an attachment will be formed. However, individual differences emerge in the quality of that attachment depending on the accumulation of information the infant gathers over many instances when the infant is seeking reassurance, comfort, or protection from threat (Weinfield, Sroufe, Egeland, & Carlson, 2008). The adults' acceptance of the infant and their ability to respond to the child's varying communications are important to forming a positive, secure attachment. The caregivers' patterns of expressing affection and rejection will influence how well babies can meet their strong needs for reassurance and comfort.

The Strange Situation. Early research on individual differences in the quality of attachment was carried out through systematic observations of babies and their caregivers in a standard laboratory procedure called the strange situation (Ainsworth, Blehar, Waters, & Wall, 1978; Bretherton, 1990). Much of this research involved babies with their mothers. As a consequence, results are typically reported in regard to the attachment styles of infants and their mothers. During an approximately 20-minute period, the child is exposed to a sequence of events that are likely to stimulate the attachment behavior system (see Table 5.7). The situation introduces several potentially threatening experiences, including the presence of a stranger, the departure of the mother,

Table 5.7 The Strange Situation Laboratory Procedure

Episode	Duration	Participants*	Events
1	30 seconds	M, B, O	O shows M and B into the room, instructs M on where to put B down and where to sit; O leaves.
2	3 minutes	M, B	M puts B down close to her chair, at a distance from the toys. She responds to B's social bids but does not initiate interaction. B is free to explore. If B does not move after 2 minutes, M may take B to the toy area.
3	3 minutes	M, B, S	This episode has three parts. S enters, greets M and B, and sits down opposite M without talking for 1 minute. During the second minute, S engages M in conversation. S then joins B on the floor, attempting to engage B in play for 1 minute. At the end of this episode, M leaves "unobtrusively" (B usually notices).
4	3 minutes	B, S	S sits on her chair. She responds to B's social bids but does not initiate social interaction. If B becomes distressed, S attempts to comfort B. If this is not effective, M returns before 3 minutes are up.
5	3 minutes	M, B	M calls B's name outside the door and enters (S leaves unobtrusively). If B is distressed, M comforts B and tries to reengage B in play. If B is not distressed, M goes to sit on her chair, taking a responsive, noninitiating role. At the end of the episode, M leaves, saying, "Bye-bye; I'll be back."
6	3 minutes	B	B remains alone. If B becomes distressed, the episode is curtailed and S enters.
7	3 minutes	B, S	S enters, comforting B if required. If she cannot comfort B, the episode is curtailed. If B calms down or is not distressed, S sits on her chair, taking a responsive role as before.
8	3 minutes	M, B	M returns (S leaves unobtrusively). M behaves as in episode 5.

*O = observer; M = mother; B = baby; S = stranger.

Source: Data from "Open Communication and Internal Working Models: Their Roles in the Development of Attachment Relationships," by I. Bretherton, in R. Dienstbier and R. A. Thompson (eds.), *Nebraska Symposium on Motivation*, 1988: *Socioemotional Development*, 36, pp. 60–61.

being left alone with a stranger, and being left completely alone—all in the context of an unfamiliar laboratory setting. During this sequence, researchers have the opportunity to make systematic observations of the child's behaviors, the caregiver's behaviors, and the characteristics of their interactions. Four infant behaviors were of special importance: contact maintenance, proximity seeking, avoidance, and resistance. These behaviors were coded and compared across varying segments of the procedure.

Four Patterns of Attachment. Using the strange situation method, four patterns of attachment behavior have been identified: (1) secure attachment, (2) avoidant attachment, (3) resistant attachment, and (4) disorganized attachment.

Infants who have a **secure attachment** actively explore the laboratory setting and interact with strangers while their mothers are present. After separation, the babies actively greet their mothers or seek interaction. If the babies were distressed during separation, once the mothers return the infants go to the mothers for comfort, and the mothers effectively reduce their distress. Then the babies resume exploring the environment.

When observed at home, babies who have a secure attachment cry less than other babies (Ainsworth, 1985; Tracy & Ainsworth, 1981). They greet their mothers more positively on reunion after everyday separations and respond more cooperatively to their mothers' requests. One can sense that securely attached babies have a working model of attachment in which they expect their caregiver to be accessible and responsive. Mothers of infants who have secure attachments are able to talk openly and coherently about their own childhood attachment figures and attachment behaviors (van Ijzendoorn, 1995).

Infants who show an **avoidant attachment** avoid contact with their mothers during the reunion segment following separation or ignore their efforts to interact. They appear to expect that their mothers will not be there when needed. They show less distress at being alone than other babies. Mothers of babies who were characterized as avoidant seem to reject their babies. It is almost as if they were angry at their babies. They spend less time holding and cuddling their babies than other mothers, and more of their interactions are unpleasant or even hurtful. At home, these babies cry a lot, they are not readily soothed by contact with the caregiver, and yet they are quite distressed by separations. Mothers of infants who show an avoidant attachment are often dismissive or devaluing of their own childhood attachment experiences (Main & Solomon, 1990).

Infants who show a **resistant attachment** are very cautious in the presence of the stranger. Their exploratory behavior is noticeably disrupted by the caregiver's departure. When the caregiver returns, the infants appear to want to be close to the caregiver, but they are also angry so they are very hard to soothe or comfort. Infants who are characterized as resistant have mothers who are inconsistent in their responsiveness. Sometimes, these mothers ignore clear signals of distress. At other times, they interfere with their infants in order to make contact. These infants do not know if their needs will be attended to. Although these mothers enjoy close physical contact with their babies, they do not necessarily do so in ways appropriate to the baby's needs. The result is the formation of an internal working model of attachment that is

highly unpredictable. These babies try to maintain proximity and avoid unfamiliar situations that increase uncertainty about accessibility to their caregiver. Caregivers of infants who have formed a resistant attachment are overly preoccupied with conflicts around their own childhood attachment issues.

In the **disorganized attachment**, babies' responses are particularly notable in the reunion sequence. These babies have no consistent strategy for managing their distress. They behave in contradictory, unpredictable ways that seem to convey feelings of extreme fear or utter confusion (Belsky, Campbell, Cohn, & Moore, 1996). Observations of mothers and infants who are described as having a disorganized attachment highlight two different patterns. Some mothers are negative, intrusive, and frighten their babies in bursts of intense hostility. Other mothers are passive and helpless, rarely showing positive or comforting behaviors. These mothers appear to be afraid of their babies, perhaps not trusting their own impulses to respond appropriately (Lyons-Ruth, Lyubchik, Wolfe, & Bronfman, 2002). The mothers often have experiences of loss or abuse in their childhood that have disrupted their own attachment experiences. Only a small percentage of infants show the disorganized pattern. Research has suggested links between the disorganized attachment and serious mental health problems in later childhood and beyond, including depression, borderline personality, and dissociative reactions (Fonagy, 2003; Lyons-Ruth et al., 2002; Lyons-Ruth & Jacobvitz, 2016).

Although categories of attachment style are still widely used in the developmental literature, the idea of attachment types or categories has come under some criticism (Waters & Beauchaine, 2003). The strange situation and its related script and coding system may constrain features of the attachment system, resulting in the emergence of a typology. In real-life situations, the expression of attachment behaviors is likely to be more fluid, adapted to the changing nature of the caregiver's responses and the conditions that provoke infant distress. Some authors prefer to think of attachment as characterized by underlying dimensions. For example, Fraley and Spieker (2003) suggested that individual differences in infant attachment can be captured along two dimensions: (1) proximity seeking versus avoidance and (2) anger and resistance. Children who are high on proximity seeking and low on anger might be thought of as secure. Children who are high on proximity seeking and high on anger might be thought of as resistant. But the exact nature of a child's working model of attachment may be more accurately characterized as some combination of these dimensions.

Parental Sensitivity and the Quality of Attachment

How can we account for differences in the quality of attachment? A cornerstone in the formation of a secure attachment is caregiver sensitivity. **Sensitivity** is defined as attentiveness to the infant's state, accurate interpretation of the infant's signals, and well-timed responses that promote mutually rewarding interactions (Mesman, Oster, & Camras, 2012). A sensitive caregiver is able to recognize the infant's emotional state, empathize with it, and make an appropriate response. An insensitive parent might recognize that the infant is distressed but be too busy or preoccupied to respond and provide effective comfort.

Caregivers who are psychologically available, responsive, consistent, and warm in their interactions with their babies—especially during the first 6 months of the baby's life—are found to be most successful in establishing a secure attachment relationship that can be measured by the time the baby is 12 months old (Braungart-Rieker, Garwood, Powers, & Wang, 2001). The way caregivers respond when infants are distressed is uniquely related

to the formation of a secure attachment independent of how they respond to other infant cues (Leerkes, Blankson, & O'Brien, 2009). This makes sense since the attachment system is theorized to be especially adapted to protecting infants from threat. The **Applying Theory and Research to Life** box discusses the possibility that there may be a sensitive period for the development of attachment.

APPLYING THEORY AND RESEARCH TO LIFE

Is There a Sensitive Period for Attachment?

A **sensitive period** is a time of utmost readiness for the development of certain skills or behavior patterns. The particular skill or behavior pattern is not likely to emerge before the onset of the period, and it is extremely difficult if not impossible to establish once the sensitive time period has passed. The successful emergence of any behavior that has a sensitive period for development depends on the coordination of the biological readiness of the organism and environmental supports (Scott, 1987).

Konrad Lorenz (1935, 1937/1961) described a process of social attachment among birds that he called imprinting. In this process, the young bird establishes a comparatively permanent bond with its mother. In her absence, however, the young bird will imprint on other available targets, including a model of its

mother or a human being. For birds, the onset of this sensitive period coincides with the time at which they are able to walk and ends when they begin to fear strangers. After this point, no new model or species can be substituted as a target for imprinting.

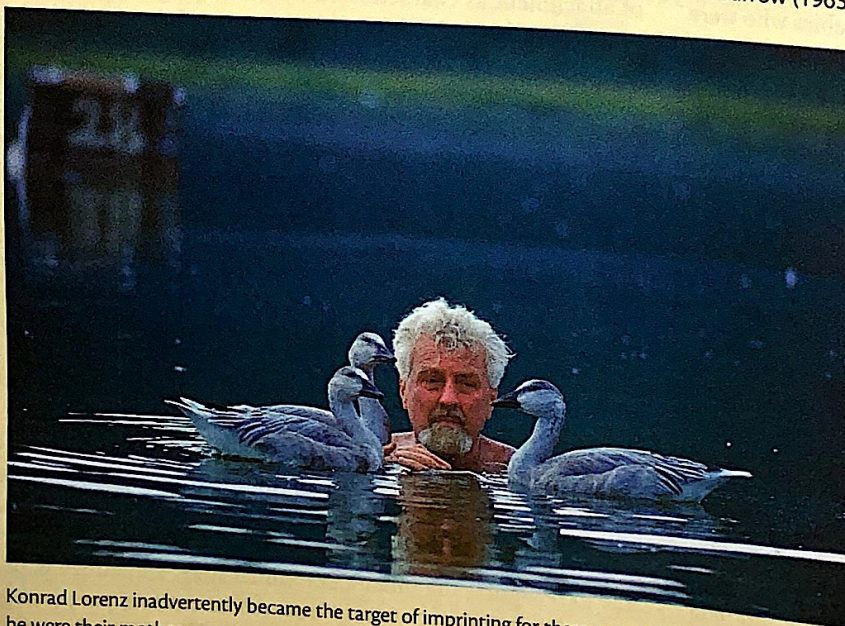
Is there a time when infants are most likely to form such an attachment to their primary caregiver? Is there a point after which such attachments cannot be formed? The answer to these questions is especially relevant for policies related to foster care and adoption. We need to know about the plasticity of social attachment in order to support optimal social and emotional development.

Evidence to address these questions has been drawn from real-life situations in which mother–infant relationships have been disrupted. Leon Yarrow (1963,

1964, 1970) observed 100 infants who were shifted from foster mothers to adoptive mothers. The infants who were separated from their foster mothers at 6 months or earlier showed minimal distress. They did not express prolonged anger or depression over the separation if their physical and emotional needs continued to be met. In contrast, all the infants who were transferred from foster mothers to adoptive mothers at 8 months or older showed strong negative reactions, including angry protest and withdrawal. These infants found the disruption of their earlier relationships very stressful.

Later research by John Bowlby (1980) focused on adolescents who had moved repeatedly from one foster home or institution to another. These children never had an opportunity to form an enduring, loving relationship with a caring adult. As adolescents, they were described as affectionless and unable to form close relationships with others. Subsequent studies of adopted children have confirmed that children who spend their infancy in institutions where the turnover in caregivers is high show disruptions in social functioning, including indiscriminate friendship formation, difficulty in forming close relationships, and difficulty in finding emotional support from peers (Rutter, 2012).

In the 1990s, a large number of orphans from Romania were adopted by families in the United States, Canada, and several European countries. While they were in the Romanian orphanages, these children had been exposed to a variety of neglectful conditions including poor nutrition, little attention or adult interaction, and long periods of time in their cribs with little opportunity for stimulation or play. Those who were



Konrad Lorenz inadvertently became the target of imprinting for these geese. They followed him as if he were their mother.

Nina Leary/Time & Life Pictures/Getty Images

adopted by 4 months of age seemed to develop quite normally. However those who were adopted at 8 months of age or older had a wide range of cognitive and affective problems that lasted into childhood. In particular, those who had longer exposure to the Romanian orphanages had disrupted social competence characterized by an overly friendly style of interaction, regardless of whether the person was a familiar caregiver or a complete stranger, and a lack of close connection to their adoptive parents (Carlson & Earls, 1997; Gunnar, 2000; Rutter et al., 2010).

In a study of children who spent their first years of life in an institution where the quality of care was good but staff turnover was high, children who were adopted at age 2 were able to form

secure attachments to their adoptive parents. However, at later observations at ages 8 and 16, the children showed evidence of difficulty in peer relations similar to the children who remained in the institution (Hodges & Tizard, 1989).

From these real-world examples of inconsistent or disrupted caregiving relationships, we can say that a sensitive period for attachment must begin at about 6 months of age. Whereas lack of continuity in caregiving during infancy is likely to produce long-lasting disruptions in relationship formation, it is not clear if there is a time after which a secure attachment can no longer be established.

Critical Thinking Questions

1. Design a research study to evaluate whether there is a sensitive period

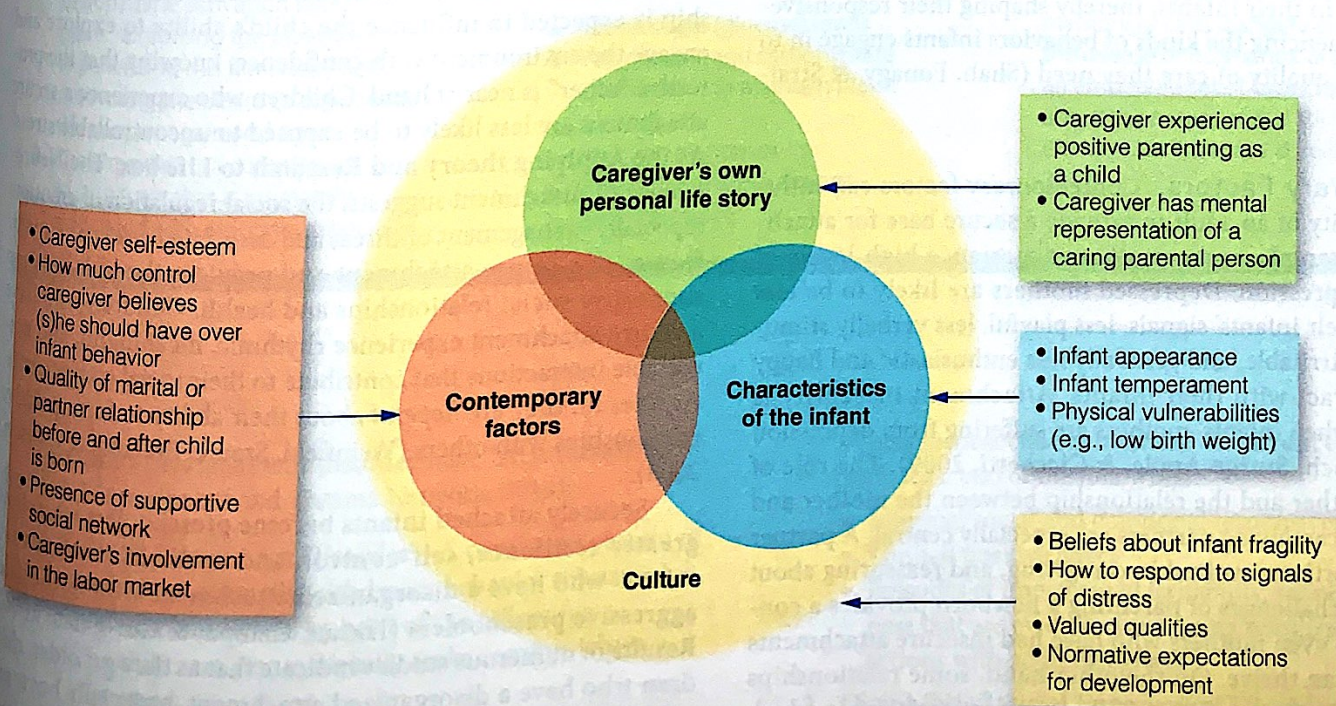
for the formation of a secure attachment. What kinds of evidence would be needed to determine whether there is a sensitive period for attachment?

2. In your research plan, explain how you could determine whether the problems arising from disruptions in early caregiving were a result of a lack of attachment or some other explanation such as poor nutrition or lack of stimulation.
3. Identify other aspects of infant development that might be characterized as having a sensitive period.
4. Apply what you have read about attachment to policies that guide practices related to foster care and adoption.

Four factors come into play in producing the kind of sensitivity that underlies secure attachments: (1) cultural and subcultural pathways, (2) the caregiver's personal life story, (3) contemporary factors, and (4) characteristics of the infant (see FIGURE 5.4 ►).

Cultural and Subcultural Pathways. Cultural and subcultural pathways are integrated into one's mental representation of a parent or caregiver. The culture's beliefs about infants, including

how fragile or vulnerable they are, how best to help infants cope with distress, and what skills or temperamental qualities are most valued, are likely to shape a caregiver's practices (Coll, 2004). For example, Japanese mothers keep close, continuous proximity to their infants. Separations are infrequent, and infants are expected to monitor their mothers' reactions in order to assess people and objects in the environment. Japanese mothers subtly direct their infants' play behavior through gestures and facial expressions. Independent play is not especially valued, and the



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FIGURE 5.4 ► FACTORS CONTRIBUTING TO CAREGIVER SENSITIVITY

idea that children would handle separation and reunion with the mother with little distress is not expected by Japanese caregivers (Okimoto, 2001).

In-depth observations of behaviors central to the survival of a group, such as caregiving strategies, establish that many cultures practice shared child care. When many adults and older siblings share responsibility for infant care, a child's needs can readily be met. When mothers expect to be able to share the tasks of infant care with others, they may also have a different ideal about the quality of infant attachment, a model that is less exclusive and possibly less emotionally intense. As a result, infants emerge with a more confident mental representation about the willingness of others to protect and care for them (Seymour, 2004).

The Caregiver's Personal Life Story. Aspects of the caregiver's personal life story contribute to being able to serve as a secure base for a child. Adults who recall their own parents as accepting, responsive, and available are more likely to be able to transmit those qualities as they enact the caregiver role. Adults who have experienced early loss or disruption of an attachment relationship have more difficulty providing a secure base for their offspring (Ainsworth & Eichberg, 1991). Some studies find that parents who have experienced significant loss in the recent past may behave in frightening or frightened ways that undermine the infant's ability to form a stable attachment representation (Stovall-McClough & Dozier, 2016).

Studies suggest that the internal working model of an attachment relationship may be transmitted across generations. Mothers and fathers draw on the model of an attachment they formed as infants and young children, which then guides their perceptions of infant cues and their own responses (Bornstein, 2012; George & Solomon, 2008). Parents' early life experiences establish patterns of reaction to the positive and negative cues they observe in their infants, thereby shaping their responsiveness and influencing the kinds of behaviors infants engage in to draw out the quality of care they need (Shah, Fonagy, & Strathearn 2010).

Contemporary Factors. Contemporary factors can influence the ability of an adult to provide a secure base for attachment. For example, some mothers experience high levels of postnatal depression. Depressed mothers are likely to be less attuned to their infants' signals, less playful, less verbally stimulating, more irritable, and generally less enthusiastic and happy as they interact with their infants. Attachment insecurity is more likely when infants' mothers are suffering from depression (Toth, Rogosch, Sturge-Apple, & Cicchetti, 2009). The role of the child's father and the relationship between the mother and father or the caregiving partners are especially central. A partner who is supportive, involved in caregiving, and reassuring about meeting the challenges of parenting a newborn provides a context in which even mothers who have had insecure attachments themselves can thrive. On the other hand, some relationships are characterized by conflict and poor communication, in which the partner may even compete with the infant for the mother's

care or impede the mother's efforts to care for her infant. Other contemporary factors that influence the caregiver's sensitivity to the infant include the caregiver's self-esteem, the degree of control the caregiver believes is necessary to have over the infant's behavior, the presence of a supportive social network that validates the person's caregiving efforts, the person's involvement in the labor market, and financial worries (Belsky, 2006; George & Solomon, 2008).

Infant Characteristics. The quality of attachment can also be influenced by the characteristics of the infant. Infants born with physical abnormalities are more likely to evoke responses of rejection or neglect from caregivers (Azar, 2012). Physical conditions such as colic can test the parents' commitment to caregiving and create a cycle of anxiety and fearfulness. Babies with colic may not find comfort in their caregivers' efforts to soothe them, and caregivers may not experience a sense of efficacy in their ability to calm their child.

Certain aspects of the infant—especially fearfulness, sociability, and the intensity of negative emotions—may influence the way the attachment relationship is established (Vaughn, Bost, & van IJzendoorn, 2008). Infants who are irritable are often difficult for parents to respond to. Over time, some parents may respond to difficult infants harshly or by withdrawing. These behaviors may produce an insecure attachment for the infant (Putnam, Sanson, & Rothbart, 2012).

The Relevance of Attachment to Subsequent Development

The nature of one's attachment and the related internal working models of attachment influence expectations about the self, others, and the nature of relationships (Shaver, Collins, & Clark, 1996). Moreover, the formation of a secure attachment relationship is expected to influence the child's ability to explore and engage the environment with confidence, knowing that the protective "other" is near at hand. Children who experience a secure attachment are less likely to be exposed to uncontrollable stress. As the **Applying theory and Research to Life box**, *The Neuroscience of Attachment* suggests, the social regulation of emotion, especially management of threat and associated stress, is a major feature of a secure attachment and provides the link between supportive social relationships and health. Children who have a secure attachment experience rhythmic, meaningful, and predictable interactions that contribute to their social competencies. As a result, they are *hopeful* about their ability to form positive relationships with others (Weinfield, Sroufe, Egeland, & Carlson, 2008).

Securely attached infants become preschoolers who show greater resilience, self-control, and curiosity. In contrast, infants who have a disorganized attachment are very hostile, aggressive preschoolers (Hazan, Campa, & Gur-Yaish, 2006). Results of numerous studies indicate that as they get older, children who have a disorganized attachment, especially boys, are at high risk for externalizing problems (Fearon, Bakermans-Kranenburg, van IJzendoorn, Lapsley, & Roisman, 2010).

The Neuroscience of Attachment

A growing body of research is addressing two intriguing questions: How does the brain support the attachment system? How is the brain altered in the context of social contacts related to attachment?

There is no single neural system that aligns in a one-to-one relationship with the construct of attachment. As Coan (2016) suggests, you can think of the whole brain as an attachment system that uses its hearing, vision, touch, smell, and movement sensory areas as well as memory, affect regulation, and stress/threat responses to form an integrated internal working model of the object of attachment. Many of the ideas we have introduced in the chapter thus far help to account for the way that filial affection unfolds rapidly and unconditionally in the infant.

1. The capacity to recognize the familiar emerges very early. Our discussion of habituation as an early form of learning confirms this idea. A preference for the familiar is supported by the production of dopamine. Positive stimuli act as reinforcers through the release of dopamine. We can understand that with repeated interactions with a familiar caregiver, a chain of dopamine activation takes place, reinforcing the pleasure of experiencing this familiarity and motivating the desire to experience this contact again and again.
2. The amygdala is a complex set of structures that is intimately associated with emotion, especially

signs of threat. Given the importance of threat assessment for survival, it is not surprising that the amygdala can be quickly activated through sensory information. But it also sends information to the prefrontal cortex, which can result in appraisal and reinterpretation of the threat. The amygdala is especially sensitive to facial expressions, promoting the capacity for social referencing. The infant can use a caregiver's facial expressions to assess emotionally charged situations, especially fear.

3. The amygdala may tag a social interaction as emotionally salient, but the hippocampus will consolidate the memory of that interaction and preserve it in long-term memory.
4. The hypothalamus regulates many metabolic processes, linking the central nervous system and the endocrine system. The hypothalamus receives signals from the amygdala, the hippocampus, and the prefrontal cortex. When these signals suggest a threat, a sequence of neural systems, known as the hypothalamic-pituitary-adrenal (HPA) axis is activated to produce cortisol. Cortisol is circulated throughout the body, influencing the following systems:
 - Blood sugar (glucose) levels
 - Fat, protein, and carbohydrate metabolism to maintain blood glucose
 - Immune responses
 - Anti-inflammatory actions
 - Blood pressure

- Heart and blood vessel tone and contraction
- Central nervous system activation

In the context of caregiving behaviors, especially social soothing, the hypothalamus can regulate the production of cortisol, returning it to baseline levels. Looking at this list, you can appreciate the role of effective nurturing and secure attachment for long-term health.

5. The prefrontal cortex is connected to all systems mentioned above. It plays a role in interpreting or appraising emotional information, regulating emotional responses, directing attention, and integrating current information with long-term memory.
6. In the first 2 years, during a period of rapid production of axons, dendrites, and synapses, the neural organization that takes place is particularly sensitive to the caregiving context. Basic, largely automatic emotional assessments and related responses are gradually modulated and interpreted by voluntary cognitive control processes. But in first months of life, efforts that the caregiver makes to comfort, soothe, and respond to infant distress shape the neural pathways associated with memory of care, instigate cues for the release of hormones, and build an embodied set of expectations about the nature of this social contact (Schore, 2013; Vatička & Vuilleumier, 2012).

Two forms of attachment disorder have been identified by the DSM-5 (Attachment and Trauma Network, 2014):

1. **Reactive Attachment Disorder** – A consistent pattern of inhibited, emotionally withdrawn behavior toward adult caregivers, manifested by both of the following:
 - The child rarely or minimally seeks comfort when distressed.
 - The child rarely or minimally responds to comfort when distressed.

A persistent social or emotional disturbance characterized by at least two of the following:

- Minimal social and emotional responsiveness to others
 - Limited positive affect
 - Episodes of unexplained irritability, sadness, or fearfulness that are evident even during nonthreatening interactions with adult caregivers
2. **Disinhibited Social Engagement Disorder** – A pattern of behavior in which a child actively approaches and

interacts with unfamiliar adults and exhibits at least two of the following:

- Reduced or absent reticence in approaching and interacting with unfamiliar adults
- Overly familiar verbal or physical behavior (that is not consistent with culturally sanctioned and with age-appropriate social boundaries)
- Diminished or absent checking back with adult caregiver after venturing away, even in unfamiliar settings
- Willingness to go off with an unfamiliar adult with little or no hesitation

In addition to these clinical diagnoses, a third form of attachment disorder has been identified as developmental trauma disorder, to be distinguished from post-traumatic stress disorder (van der Kolk, 2005). According to experts who work in the field of stress and trauma, the symptoms associated with developmental trauma disorder occur when a child or adolescent has experienced or witnessed multiple or prolonged adverse events over a period of at least 1 year beginning in childhood or early adolescence, including:

- Direct experience or witnessing of repeated and severe episodes of interpersonal violence, and
- Significant disruptions of protective caregiving as the result of repeated changes in primary caregiver, repeated separation from the primary caregiver, or exposure to severe and persistent emotional abuse.

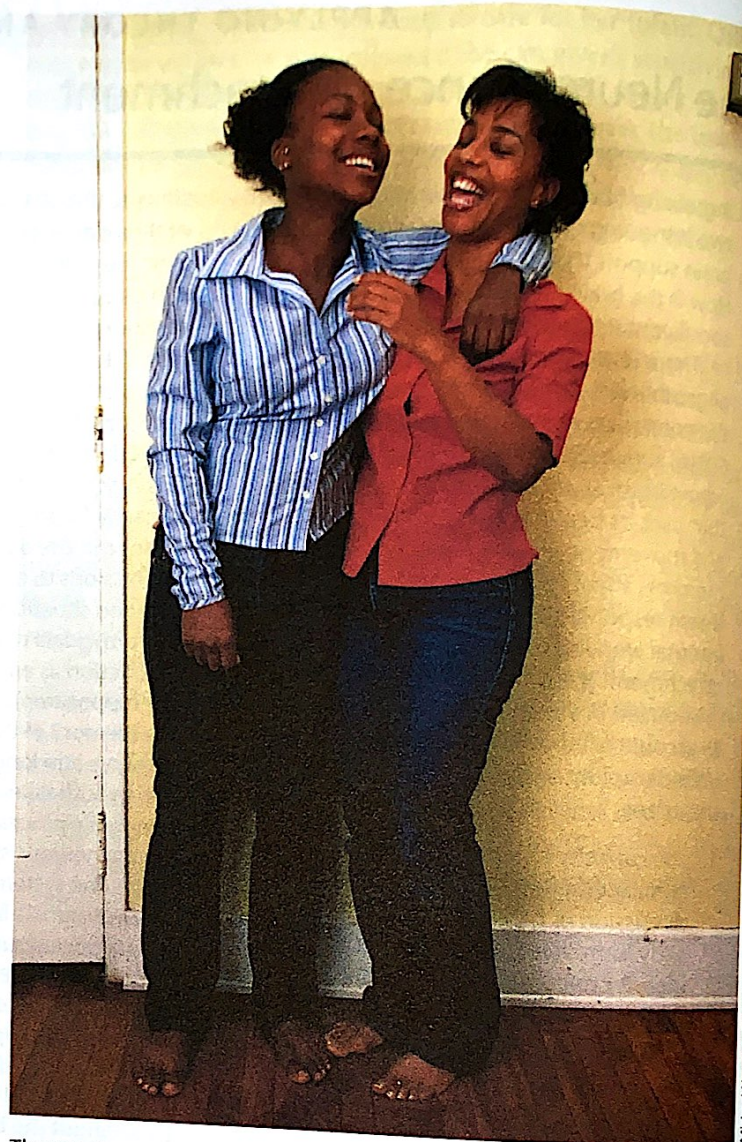
As a result of these experiences, children who experience developmental trauma disorder have significant difficulties regulating arousal and self-soothing, difficulties managing attention, preoccupation with threat, and difficulties managing social relationships including those with caregivers and peers.

From a life-span perspective, the quality of the attachment formed in infancy influences the formation of later relationships. Children who have formed secure attachments in infancy are likely to find more enjoyment in close peer friendships during their preschool years. In an analysis of the results of more than 60 studies of the relationship of parent-child attachment and peer relations, the quality of attachment with the mother was consistently predictive of the quality of close peer friendships well into middle school and early adolescence (Schneider, Atkinson, & Tardif, 2001). Children who have secure attachments are more likely to attribute positive intentions to peers, whereas children with anxious attachments are more likely to view peers with wariness.

The attachment construct has been used to help explain the nature of adolescent and adult love relationships as well as characteristics of adult parenting behaviors. These topics will be covered in chapter 11, Early Adulthood.

Critique of the Attachment Paradigm

The attachment paradigm and its measurement using the strange situation have significant limitations especially when viewed from a cross-cultural or comparative cultural lens. Three criticisms are discussed here; you may think of others.



The attachment construct continues to be evident in adult, loving relationships. This mother and daughter enjoy physical closeness, comfort each other, and look to each other for reassurance in times of stress.

1. The strange situation analyzes the child-caregiver attachment based on how the infant copes with the stressors associated with separation from the caregiver. Although one might assume that infant-caregiver separation is a universal problem, it is much more common in some cultures than others. For example, in many parts of Asia, Africa, and South America, infants sleep with their mothers and are carried on the mother's back or side throughout the day. Close physical contact is a culture's way of conveying warmth and safety. The prolonged physical separation that would occur if a baby sleeps in a bassinet or in a separate room would be considered harsh or cruel parenting. Thus, the premise that attachment can be assessed by how well a baby copes with separation may be a poor yardstick in cultures where infant-mother separation is rare and not highly valued (Greenfield, Keller, Fuligni, & Maynard, 2003).

2. The attachment framework and the strange situation emphasize the nature of the mother–infant dyad as the prototype of an attachment relationship. Although some research has been carried out to compare attachment to mothers and fathers, or mothers and caregivers, the focus is on a dyadic attachment. However, in many cultures, the infant is cared for by a cluster or collective of older siblings, cousins, aunts, fathers, and uncles, as well as the mother and other specially designated caregivers. In these cultures, the ability of the child to feel safe and secure depends on the coordinated care of many members of the family or village rather than exclusive care by the mother. The strange situation in particular and the attachment paradigm more generally do not capture the fluid nature of this collective caregiving context and the degree to which it is effective in supporting a child's feelings of safety and security (Lewis, 2005).
3. Infant–caregiver interactions can be understood as an introduction to the nature of valued social relationships which, over time, will contribute to the child's survival and successful integration into the social community. One of the assumptions of the attachment framework is that a secure attachment provides a safe harbor from which the child feels free to explore the environment. From this view, attachment is a foundation for subsequent independence. However, autonomy, exploration, and self-reliance are not primary goals of socialization in all cultures. Societies marked by greater value for interdependence view the formation of infant attachment as a precursor to obedience, intragroup harmony, and acceptance of cultural norms and values.

Thus, while the need to ensure the survival of the young through sensitive and responsive care may be a cultural universal, the socialization goals that follow from the formation of a secure attachment may differ from one culture to the next depending

upon the culture's goals, values, and traditions (Mesman, van IJzendoorn, & Sagi-Schwartz, 2016; Weisner, 2005).

FURTHER REFLECTION: Explain the evolutionary basis for the attachment behavior system. In this light, hypothesize why very small babies might be vulnerable to the formation of insecure attachments.

Describe the concept of sensitive caregiving. How might contemporary life events disrupt an adult's ability to provide sensitive care?

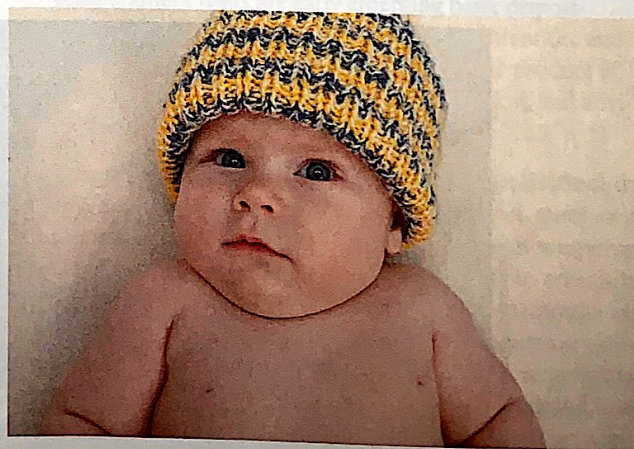
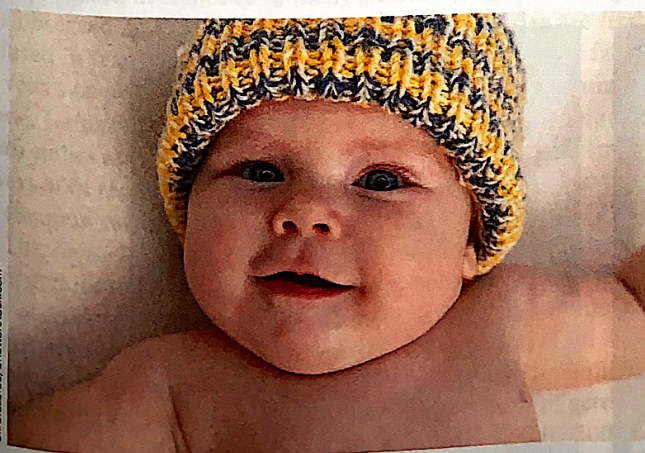
Emotional Development

OBJECTIVE 6 Examine the nature of emotional development, including emotional differentiation, the interpretation of emotions, and emotional regulation. Analyze the concept of temperament as an organized aspect of emotional reactivity.

Emotional development during infancy can be understood along four dimensions. First, new emotions emerge. Infants express these emotions at different levels of intensity—for example, from a whimper or fussy noise to a full-blown angry rage, or from a happy cooing gurgle to outright laughter. Second, with cognitive maturation, a child interprets events differently. New emotions may become attached to familiar situations. An experience that may once have caused wariness, such as a new toy or a loud noise, may become a source of excitement or joy as the child gains a new understanding of the situation. Third, children develop strategies for regulating their emotions so that they are not overwhelmed by emotional intensity. Fourth, emotions serve as a channel for adult–infant communication.

Emotional Differentiation

New emotions gradually emerge during the first 2 years of life. Peter Wolff (1966) described seven states of arousal in newborn infants: regular sleep, irregular sleep, periodic sleep, drowsiness,



At 3 months of age, infants can communicate their emotional state using different facial expressions. Sensitive caregivers can detect happiness, excitement, wariness, sadness, and frustration.

alert inactivity, waking activity, and crying. Each is characterized by a different pattern of breathing, muscle tone, motor activity, and alertness. In these states, one observes the earliest distinct emotions of distress (*crying*), interest (*alert inactivity*), and excitement (*waking activity*). A newborn's state of arousal influences the capacity to respond to the environment. Changes in arousal also prompt responses from caregivers. Crying usually brings an effort to comfort or soothe. Visual alertness is likely to prompt social interactions with caregivers who use a variety of strategies to sustain contact such as smiling, making cooing sounds, or shaking a toy or rattle.

Crying is an especially important emotional expression that contributes to the infant's survival. Until about 6 or 7 months of age, the infant's mobility is quite limited. The cry is one of the primary signals available that will bring the caregiver to the infant. Infant cries vary in pitch as well as in tempo and duration. Adults have measurable emotional reactions to infant crying, including changes in heart rate, breathing, and perspiration, which indicate that the cry serves as a stressor. Studies from laboratory and natural field settings and across cultures suggest that high-pitched cries are considered more upsetting to the caregiver and are treated as a signal of a more urgent need than are low-pitched cries. Moreover, information is contained in the pauses between cries. Cries that involve shorter pauses between crying sounds are perceived by adults as more arousing and unpleasant (Groh & Roisman, 2009; Zeskind, Klein, & Marshall, 1992).

Emotional responses during the first month are closely tied to the infant's internal state. Physical discomfort, arousal, pain, and changing tension in the central nervous system are the major sources of emotions. During the period from 1 to 6 months, emotions begin to reflect the infant's awareness of features of the environment. Babies smile at familiar faces; they show interest in and curiosity about novel stimuli. They express rage when nursing is disrupted or when they are prevented from viewing an activity they have been intently watching.

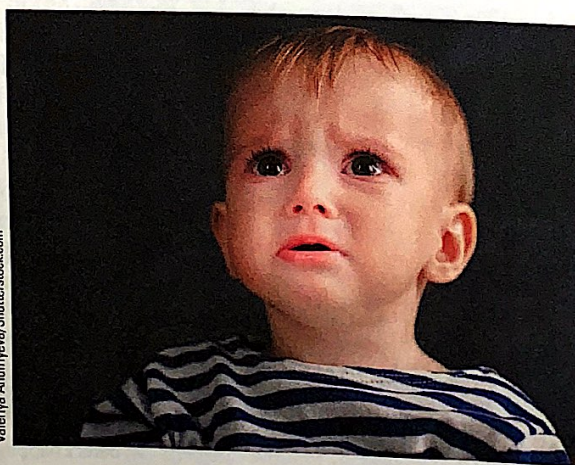
From 1 to 6 months, the intensity of emotional expression becomes more varied. For example, four different kinds of infant smiles have been observed: the simple smile in which a baby's mouth curves upward at the corner; the Duchenne smile,

which involves crinkling eyes, raised cheeks, and an open, smiling mouth; the play smiles in which the jaw drops and the mouth stays open; and the duplay smiles in which the jaw drops and the cheeks are raised (Fogel et al., 2006). The simple smile is considered a signal of happy social engagement, whereas the Duchenne, play, and duplay smiles reflect different levels of intensity in play that accompany such activities as tickling, peek-a-boo, and playful interactions with familiar caregivers.

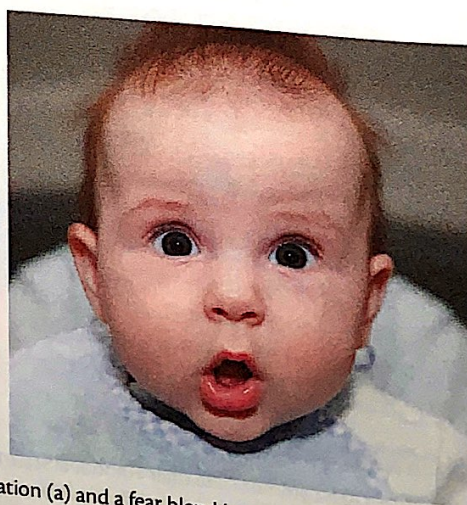
The period from 6 to 12 months reflects a greater awareness of the context of events. Emotions of joy, anger, and fear are tied to a baby's ability to recall previous experiences and to compare them with an ongoing event. These emotions also reflect the ability to exercise some control over the environment and frustration when goals are blocked. Fearfulness, assessed several times from 4 to 12 months, increases steadily over the first year. Babies who are less fearful at 4 months show a steeper increase in fear than babies who are already quite fearful at a very young age (Gartstein et al., 2010).

The dimension of wariness-fear becomes more differentiated during the second year. Wariness is viewed as an early feature of the attachment process, especially as it relates to stranger anxiety at about 6 months and separation anxiety at about 9 months. Fear responses are relatively rare among young infants. It may be that fear needs to be learned as babies gain experiences that result in the appraisal of threat. Fear of a more nonspecific form begins to be observed during the second year. Babies begin to anticipate negative experiences and express fear of objects or events that have been associated with negative experiences in the past. In the image on the left below, the fear response is evoked when a nurse returns for the second of two inoculations. In some instances, as in the image on the right, one sees the expression of fear blended with surprise, as when a novel toy emits a loud noise or a dog makes a sudden move toward the infant (Sullivan & Lewis, 2003).

By the end of the first year, the extent of an infant's negative emotions, such as irritability and fear, are influenced by the caregiver's depression and anxiety. The impact of maternal depression on infants' psychosocial development has received a great deal of attention in the literature, demonstrating that there are



Valeriya Anufriyeva/Shutterstock.com



Ana Blazic Pevlovic/Fotolia

A fear expression in response to approach of a nurse following inoculation (a) and a fear blend in response to the sudden appearance of a stimulus (b).

distinct differences in the emotional expressiveness and social engagement of infants of depressed mothers. Higher levels of maternal depression and anxiety in infancy are linked to greater increases in fearfulness at the end of infancy, and more symptoms of anxiety at age 2 (Gartstein et al., 2010). Positive emotions are not as clearly tied to the caregiver's characteristics (Pauli-Pott, Mertesacker, & Beckman, 2004).

Emotions that are observed during the second year of life, 12 to 24 months—especially anxiety, pride, defiance, and shame—suggest an emerging sense of self. Infants recognize that they can operate as causal agents. They also begin to respond to the emotions of others. They can give love to others through hugs, kisses, and tender pats. They can share toys, comfort another distressed infant, and imitate another person's excitement. In becoming a more distinct being, an infant achieves a new level of awareness of the capacity to give and receive pleasure as well as the vulnerability of self and others.

Emotions as a Key to Understanding Meaning

An infant's emotional reactions provide a channel for determining the meaning the child is giving to a specific situation. Often, these reactions are studied by the systematic coding of facial expressions. One example of how emotions provide a window on meaning comes from a study of infants in an operant conditioning experiment. Infants at ages 2, 4, and 6 months were observed while they learned an operant arm-pulling task. A string was attached to the infant's wrist. When the string was pulled, it activated a switch that turned on a color slide of an infant smiling accompanied by the sound of children singing the *Sesame Street* theme song. During the learning phase, pulling the string produced the visual and auditory stimulus. During the extinction phase, nothing happened when the string was pulled. Even as young as 2 months old, the babies' expressions changed from interest and enjoyment during the learning phase to anger and sadness during the extinction phase. The study illustrates that infants' anger is associated with violation of their expectations and that expressions of interest and enjoyment are associated with learning and increased control (Sullivan, Lewis, & Alessandri, 1992).

An infant's smile can have a wide variety of meanings and can be produced in response to many stimuli. *Social smiles* begin to be observed at about 5 weeks of age. These smiles are first produced in response to a wide range of stimuli: familiar faces and voices (especially the mother's), strangers, and nonhuman objects. Games such as tickle and peek-a-boo bring on open-mouth smiles and laughter (Fogel et al., 2006). The social smile conveys both recognition of familiarity and an invitation to further communication or interaction.

The *cognitive smile* develops alongside the social smile. Infants smile in response to their own behaviors, as if they were expressing satisfaction with their accomplishments or were expressing recognition. In a study of infants over the period from 7 to 20 weeks, babies were observed to show the *coy smile*—smiling while averting their gaze—when they were successful in getting attention or renewing attention from an adult (Reddy, 2000). As evidenced in the string-pulling task described previously, infants make a *mastery smile* when they are able to make something happen.

In the second year of life, smiling is associated with a primitive form of *humor*. Babies smile when they recognize an incongruity, such as seeing their mother drinking from a baby bottle or crawling on her hands and knees. They also smile and laugh when they violate a caregiver's expectations. These smiles suggest that the baby appreciates something about the discrepancy between what is being presented and what is normally observed (Loizou, 2005).

The Ability to Regulate Emotions

Emotional regulation refers to a variety of processes that allow infants to control the intensity of their emotional state and reduce feelings of distress. These abilities, which mature over the first 2 years, have important implications for a child's successful social participation in preschool and later childhood (Calkins & Leerkes, 2011). Infants develop a range of techniques for coping with intense emotions, both positive and negative. Even newborns have some strategies for reducing the intensity of distress, such as turning the head away, sucking on their hands or lips, or closing their eyes. As infants gain new motor coordination and control, they can move away, distract themselves with other objects, or soothe themselves by rocking, stroking, or thumb sucking (Kopp, 1989). One study compared 3-, 5-, and 7-month old infants as they reacted to their mother and their father who were showing them the "still face." Infants who looked away or who engaged in some kind of self-soothing activity showed a decrease in distress; infants who engaged in intense motor activity showed an increase in distress (Ekas, Lickenbrock, & Braungart-Rieker, 2013). There are many instances when infants are not able to regulate the intensity of their emotions. Researchers who work with infants often note the number of babies who had to be eliminated from their study because they simply could not be calmed enough in the experimental procedure to attend to the task. The way an infant reacts to environmental stimuli and the intensity of that reaction is often conceptualized as a reflection of the concept of temperament.

Temperament. **Temperament** is a theoretical construct that refers to relatively stable characteristics of response to the environment and patterns of self-regulation (Putnam, Sanson, & Rothbart, 2012; Thomas & Chess, 1980).

Temperament traits are early emerging basic dispositions in the domains of activity, affectivity, attention, and self-regulation, and these dispositions are the product of complex interactions among genetic, biological, and environmental factors across time. (Shiner et al., 2012, p. 2)

Temperament is a significant source of individual differences. When we describe babies as active, cheerful, quiet, or fussy, we are making reference to what scholars study as temperament. One of the underlying questions is the extent to which infant temperament is predictive of adult personality. Although aspects of temperament that might be observed in infancy are quite different from the features of adult personality, it is possible that features of temperament, such as inhibition or wariness, and features of adult personality, such as shyness or social anxiety, may be reflections of a common underlying dimension. Theorists have offered different views about the specific features of temperament and what accounts for the stability of these features over time.

Table 5.8 Three Types of Infant Temperaments

Type	Description	% of Total Sample
Easy	Positive mood, regular body functions, low or moderate intensity of reaction, adaptability, positive approach rather than withdrawal from new situations	40
Slow to warm up	Low activity level, tendency to withdraw on first exposure to new stimuli, slow to adapt, somewhat negative in mood, low intensity of reaction to situations	15
Difficult	Irregular body functions, unusually intense reactions, tendency to withdraw from new situations, slow to adapt to change, generally negative mood	10

Note: Some researchers prefer terms such as flexible and active, cautious, and feisty rather than easy, slow to warm up, and difficult, which have judgmental connotations.

Source: From "The Origin of Personality," by A. Thomas, S. Chess, and H. Birch, 1970, *Scientific American*, 223, pp. 102–109.

(Vaughn & Bost, 2016). The following section reviews four views of temperament.

Dimensions of Temperament. Thomas, Chess, and Birch (1970; Thomas & Chess, 1977) used observations of nine dimensions to classify infants into three temperamental groupings: *easy*, *slow to warm up*, and *difficult*. Table 5.8 summarizes the characteristics of each of these temperaments and the percentages of the sample that could be clearly identified as one of the three types. Roughly 35 percent of the sample could not be classified. Some researchers use different labels to describe these types, reflecting an understanding that some aspects of infant behavior are difficult for some parents but easy for others. In newer work, the types are labeled "resilient," "undercontrolled," and "overcontrolled," terms that capture features of self-regulation, and seem less judgmental (Caspi & Shiner, 2006).

Buss and Plomin (1984/2015; 1986) identified three aspects of temperament—activity level, sociability, and emotionality—that they thought were influenced largely by genetic factors. Further work has included impulsivity, a trait comprising difficulties with emotional and behavioral control, persistence, and planfulness as showing a strong genetic basis (Gagne & Saudino, 2010; Saudino & Zapfe, 2008). Patterns of electrical activity in the frontal cortex in infancy have been associated with individual differences in these features of temperament, particularly distinguishing between babies who are more able to regulate their emotions, who are easily soothed, and who seem to be relatively positive as contrasted to the babies who are easily distressed, difficult to soothe, and have difficulty focusing their attention (Schmidt, Fox, Perez-Edgar, & Hamer, 2009). These dimensions—especially emotionality and activity level—show modest stability over adjacent periods of infancy and toddlerhood (Henderson, Fox, & Rubin, 2001). Genetic factors appear to account for stability in temperament across different settings (e.g. laboratory and home). However, genetics and

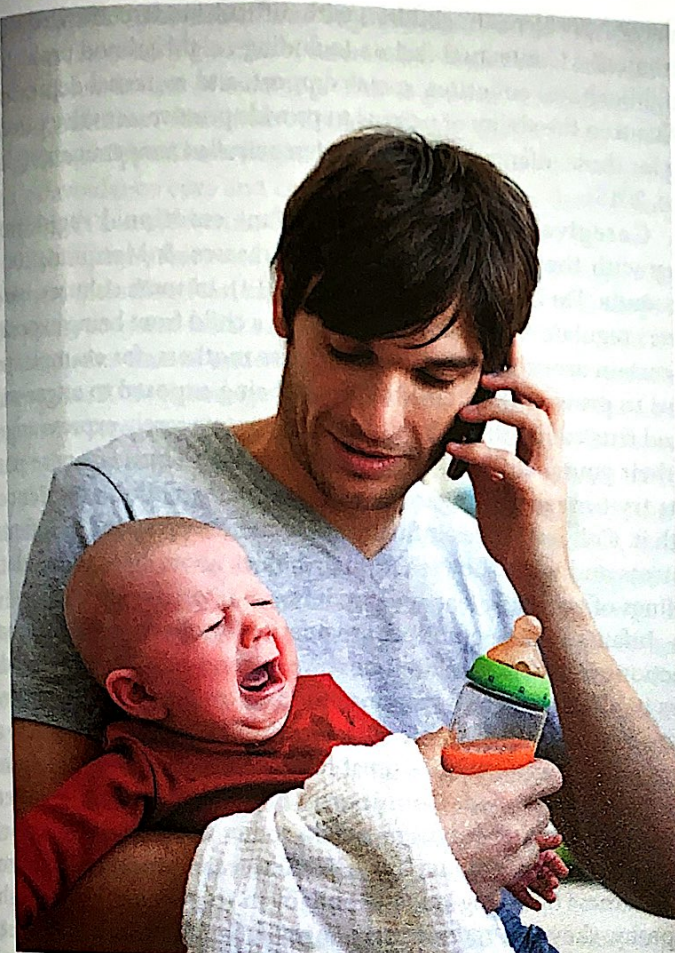
environment also interact, especially when considering possible prenatal influences on development, and the differential sensitivity of infants to nurturing versus harsh parenting (Braungart, Plomin, DeFries, & Fulker, 1992; Goldsmith & Campos, 1986; Goldsmith et al., 1987; Shiner et al., 2012; Wilson & Matheny, 1986).

Another view of temperament focuses on the construct of **behavioral inhibition**, a combination of fearfulness, a low threshold for arousal in the presence of novel or unusual stimuli, and general cautiousness. A method of assessing behavioral inhibition involves presenting infants with a set of unusual stimuli and observing their reactions. Some infants seem to think this is great fun. They smile, coo, and respond with positive excitement. Other infants get very distressed. They cry, struggle, arch their backs, and try to escape the situation. These early reactions in the laboratory setting at 4 months of age are predictors of toddler behavior. The infants who react positively to the novel stimuli are likely to become active, busy, exploratory toddlers. The infants who react with distress to the novel stimuli are likely to become fearful, shy, and socially wary toddlers (Kagan & Snidman, 2004).

Rothbart (1981; Rothbart & Bates, 2006) characterized temperament as "constitutionally based individual differences in reactivity and self-regulation in the domains of affect, activity, and attention" (Rothbart & Bates, 2006, p. 100). Rothbart's research led to the identification of three overarching dimensions of temperament: surgency/extroversion, negative affectivity, and effortful control. These dimensions, viewed as present in infancy, undergo maturation associated with the emerging neural basis for attention and self-regulation. Studies of mothers' and fathers' observational ratings of their infants support the stability of these dimensions from infancy to toddlerhood, with the exception that orienting/regulating is observed in very young infants as the precursor to effortful control in toddlers (Casalin, Luyten, Vliegen, & Meurs, 2012).

A child's temperament influences the tone of interactions, the frequency with which interactions take place, the way others react to the child, and the way the child reacts to the reactions of others. Highly active, sociable children are likely to initiate interactions and to respond positively to the attention of others. More passive, inhibited, or fearful children will be less likely to initiate interactions and may withdraw when other children or adults direct attention to them. There is growing concern that infants and toddlers who are temperamentally shy, fearful, and readily distressed by novel or unfamiliar situations may be vulnerable to subsequent difficulties regulating anxiety and depression (Moffitt et al., 2007).

The kind of caregiving a child receives will depend in part on the parental context. For example, Thomas and Chess (1977, 1986) found that when parents were calm and allowed their difficult children to adapt to novelty at a leisurely pace, the children grew more comfortable and had an easier time adapting to new routines. However, if parents were impatient and demanding, then their difficult children remained difficult and had a hard time adjusting to new situations as they grew older. A mother's age, her economic resources, the nature of the neighborhood where she lives, and characteristics such as depression, stress, or a sense of parenting efficacy might each influence how patient and supportive a mother may be with a child who has an emotionally negative or irritable temperament (Paulussen-Hoogbeem, Stams, Hemranns, & Peetsma, 2007).



Cultura Creative/Alamy Stock Photo

Is this baby showing evidence of a difficult temperament or is the protest a result of the father's lack of attention? What observations would you need to make in order to answer this question?

Child outcomes are understood as a product of child temperament and parenting strategies (Rothbart & Bates, 2006). Many studies emphasize the relevance of the fit or match between the parent's temperament and that of the child (Rettew et al., 2006). Depending on the caregiving they receive and the environments they encounter, shy children can become sociable, fearful children can become secure explorers of their surroundings, and highly exuberant children can develop considerable self-control (National Research Council and Institute of Medicine, 2000, p. 389). In all likelihood, temperamental characteristics are modified as they come into contact with socialization pressures at home and at school, as well as with new internal capacities to regulate behavior.

A few examples of this kind of interaction follow:

- Gentle, low-power discipline techniques are more effective in socializing infants who are relatively fearful and inhibited; these techniques do not work well with temperamentally fearless infants who respond better to socialization strategies that emphasize positive feelings between the mother and child (Kochanska, Aksan, & Joy, 2007).
- Children who are fearful are more likely to be inhibited with their peers when their mothers are overprotective, but more confident with their peers when their mothers

are reassuring and supportive of the child's autonomy (Rubin, Hastings, Stewart, Henderson, & Chen, 1997).

- Parental use of harsh punishment is not predictive of aggressive behavior for children who are flexible and low in reactivity but is strongly linked to aggressiveness among children who are inflexible and highly reactive (Patterson & Sanson, 1999).

These and other findings create a complex picture of differential sensitivity and reactivity to the features of the caregiving environment. Children differ in the extent to which they detect and react to environmental demands or threats (Moore & Depue, 2016). A modest level of parental dominance or assertiveness may be frightening and intimidating for a child with high behavioral inhibition, and completely insignificant for a child with low behavioral inhibition (Gilissen et al., 2007). Consider the role of temperament in the case study on the Cotton family.

— CASE STUDY The Cotton Family —

Nancy and Paul Cotton are a professional couple who gave birth to their first child, Anna, after they had been married for 7.5 years.

Nancy said, "We wanted a baby but couldn't decide when to have one. Finally we realized that we could not control everything, or time things perfectly. No one can predict the future. So we finally decided to go ahead and have a child as soon as possible. ... By the time we had Anna, I was thirty-three, and our marriage and careers were established. We felt secure.

"Being an optimistic person, I guess I expected nirvana. Anna was difficult to deliver, and breastfeeding was a nightmare. Every time she nursed, it hurt. But I didn't want to miss the opportunity. I was so determined. I used a stopwatch to make sure Anna got enough milk, and I gave her a pacifier for recreation. When she was five weeks old, I went off to our summer house on Martha's Vineyard. I wondered if it was the right decision because there was less in the way of family and friends for support. But we worked things out together that summer. She was energetic from the first, and I was constantly sleep-deprived, but we were oh! so close. I found ways to make it easier for us. I used the 'Swyngomatic' so that I could eat a warm supper every once in a while, and I learned to give Anna pacifiers or bottles to soothe herself."

Paul interjected: "She was like a miracle to me. She was fabulous! Miraculous! She even looked like me. I did as much for her as Nancy did, not out of guilt, but because I couldn't keep my hands off her. I took her with me everywhere when I was off work. At the Stop-and-Shop, all the ladies crowded around me, 'How do you do it? You're so good with her!' I learned all about babies from her. I can bathe a kid faster than anyone in the world."

"Anna fit," said Nancy. "From the time she was born, we'd pick her up and just go. As you can see, going is pretty important in our family, and Anna thrived on it. We were not the only ones who enjoyed her; my own mother thought she was fabulous. She took care of her

part-time after I went back to work. I had a chance to see my mother be loving and kind, a good mother to Anna. It was like reliving my own childhood—another kind of miracle. You see, I'd had a sister, Ginny, who had died. Anna gave my mother an opportunity to heal the pain of Ginny's death. This was true for me, too."

CASE ANALYSIS Using What You Know

1. Describe Anna's temperament. What problems might the Cotton family have faced if Anna had been a more passive, reserved, and inhibited child?
2. Evaluate the ways that Anna was expected to adapt to the Cotton family lifestyle.
3. List some of the challenges Nancy and Paul faced as new parents. How did they cope with these challenges?
4. Describe and assess Paul's enactment of the father role. Describe and assess Nancy's enactment of the mother role. How well do they match the features of sensitive parenting?
5. Anna seems to be influencing the well-being of her mother, father, and her grandmother. What impact does Anna have on each of these family members?

How Caregivers Help Infants Manage Their Emotions.

One of the most important elements in the development of emotional regulation is the way caregivers assist infants to manage their strong feelings. Caregivers can provide direct support when they observe that a child is distressed. They may cuddle, hug, rock, or swaddle a baby. They may offer food or a pacifier to the baby or nurse her as a means of comfort. Through words and actions, the caregiver may help a child interpret the source of the stress or suggest ways to reduce the stress.

In a longitudinal study of maternal comforting strategies, mothers were observed as they tried to comfort their children following an inoculation at 2 and 6 months of age. The intensity and duration of infant crying decreased over this 4-month period. At the younger age, mothers used affection and soothing as comforting strategies when their babies cried after the shot; at 6 months, they used vocalization and distracting strategies more often, taking advantage of the infant's more developed capacities for attention and playfulness. For all levels of infant distress, the most effective method of soothing was a combination of holding/rocking and vocalizing, combining the sense of touch and the rhythmic movement of rocking with the calming features of the mother's voice (Jahromi, Putnam, & Stifter, 2004).

Concern has focused on babies who show intense negative emotionality early in infancy. Babies who show high levels of motor activity and who cry a lot at 4 months of age have been found to show high levels of wariness, fearfulness, and shyness at later ages. Babies who show high levels of fearfulness appear to be at risk for later problems with social anxiety (Buss, 2011). Studies have analyzed individual differences in negative emotionality and the family characteristics that might be associated with changes in negativity over the first year of life (Calkins & Howse, 2004; Pauli-Pott et al., 2004). In a longitudinal analysis of the relationship of parenting environments and infant temperament among a sample of over 2,000 Canadian families, exposure to more positive parenting reduced

behavior problems in children with difficult/undercontrolled temperaments. Contextual factors including neighborhood problems, neighborhood cohesion, social support, and maternal depression influenced the ability of parents to provide positive, sensitive parenting for those infants with more undercontrolled temperaments (Gallitto, 2015).

Caregivers' approaches to infant emotional regulation vary with the culture (Kitayama, Karasawa, & Mesquita, 2004; Mesquita, De Leersnyder, & Albert, 2014). In some cultures, caregivers regulate emotions by preventing a child from being exposed to certain arousing situations. Japanese mothers, for example, try hard to prevent their children from being exposed to anger and avoid frustrating them. Furthermore, parents rarely express anger to their young children, especially in public. Thus, Japanese parents try to regulate anger by minimizing the child's experiences with it. Cultural values influence how mothers respond to infants' distress and what they teach their babies about how to regulate feelings of wariness, fear, and anxiety.

Infants achieve emotional regulation by observing emotional reactions of others. Children observe anger, pride, shame, or sadness in others, often in response to their own emotional expressions. For example, Connie stumbles and falls in trying to take a step on her own. She looks up at her mother. If her mother looks upset and frightened, Connie may begin to cry. On the other hand, if her mother laughs or speaks to her in a comforting tone, Connie may get up and try again. Children can be distracted from their sadness by seeing laughter and joy in someone else. Through empathy, they can reduce their angry feelings toward someone else by seeing how sad or frightened the other person is.

As children understand the consequences or implications of a situation, they have new motives for regulating or failing to regulate their emotions. Children may extend or expand their signals of distress if they think it will help them achieve their goals, such as special attention or nurturing. Children may try to disguise their distress if they think it will provoke additional pain. Emotional regulation, like emotional signaling, takes place in an interpersonal context.

Emotions as a Channel for Adult-Infant Communication

Emotions provide a two-way channel through which infants and their caregivers can establish **intersubjectivity**. An infant has the capacity to produce a range of emotional expressions, including fear, distress, disgust, surprise, excitement, interest, joy, anger, and sadness. Parents and other caregivers rely on facial, vocal, and behavioral cues related to these emotions as ways of determining an infant's inner states and goals, and responding to them. Using techniques for recording neural electrical activity, studies find that infant smiles and cries stimulate different areas of the caregiver's brain. Both biological and adoptive mothers react with special sensitivity to their infant's crying (Doi & Shinohara, 2012).

The mirror neuron system provides infants and adults with the capacity to link seeing and doing. This system is activated both when we perform an action and when we see someone else perform that action. Thus it creates an early neural bridge for social understanding of behavior. Mirror neurons support an infant's capacity to imitate adult expressions, and for adults to

recognize and interpret infants' expressions. Mirror neuron processes are needed for social connection but are not adequate for the co-construction of meaning. This is gradually supplemented by joint attention, shared emotional referencing, and the attached association of positive or negative reactions that provide approach and/or avoidance cues and create a framework for shared values (Rochat & Passos-Ferreira, 2009).

Babies can detect and differentiate the affective expressions of others including fear, anger, happiness, sadness, and surprise. They can recognize facial expressions at 4 months of age, but they require further time to understand the meanings of these expressions (Grossman, 2013; Kaneshige & Haryu, 2015). In cycles of interaction, responsive caregivers monitor changes in a baby's affect as a way of determining whether their interventions are effective (Meins, 2011).

Think of a 6-month-old baby who wants a toy that is out of reach. The baby waves her arms in the direction of the toy, makes fussy noises, and looks distressed. As her father tries to figure out what the baby wants, he watches her expressions in order to discover whether he is on the right track. Parents who are attuned to this form of communication are more likely to help babies to achieve their goals, and babies are more likely to persist in attempts to communicate because they have experienced success in such interactions. Through a shared repertoire of emotions, babies and their caregivers are able to understand one another and create common meanings. Thus, emotional expression becomes a building block of trust (Trevarthen & Aitken, 2001).

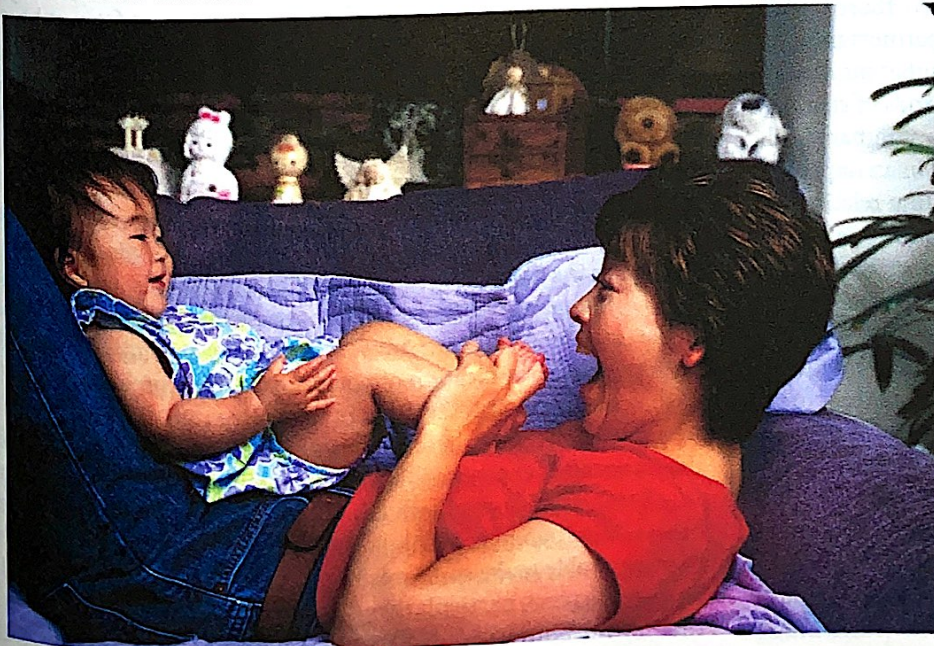
Social Referencing. One of the most notable ways that infants and adults have of co-constructing their reality is the mechanism of **social referencing** in which infants gather information about a situation or an object by assessing their parent's or caregiver's reactions. Social referencing involves three coordinated processes: (1) The infant coordinates attention between the adult and an ambiguous object or situation; (2) the infant understands that the adult's emotional reaction refers to the specific object or

situation; (3) the infant uses the information from the adult's emotional reaction to guide behavior toward the object (Feinman et al., 1992; Hornik & Gunnar, 1988; Murray et al., 2008). By 12 months of age, infants can draw upon all of these abilities to use the emotional responses of another person to guide their own behavior (Carver & Vaccaro, 2007). They often use their mothers as a *social reference*, but other adults can serve this function as well. As infants approach an unfamiliar adult, an ambiguous situation, or a novel object, they look to their mother and use her facial expression or verbal expressions as a source of information about the situation. If the mother expresses wariness or a negative emotion, the infant is more likely to withdraw or to explore with caution. On the other hand, if the mother expresses a positive emotion, the infant is more likely to approach the situation or the unfamiliar person with confidence. By 12 months of age, infants consistently use this mechanism to try to appraise an ambiguous situation (de Rosnay, Cooper, Tsigaras, & Murray, 2006; Rosen, Adamson, & Bakeman, 1992).

In an extension of the social referencing concept, researchers wondered whether infants could gather information by observing how adults interacted with each other in relation to an object (Repacholi & Meltzoff, 2007). In an experimental situation, infants observed while one adult (the experimenter) performed specific activities with an object and a second adult (the emoter) expressed either an angry or a neutral reaction to the first adult. For example, the angry adult might say to the experimenter who was demonstrating an activity with an object, "That's aggravating! That's so annoying," while speaking in an angry tone of voice and using angry facial expressions. Then the infants were given an opportunity to touch the object while the experimenter and the emoter sat quietly in the room. Infants who observed the angry emoter were less likely to imitate the activity, slower to touch the object, and more likely to look at the angry adult who remained in the room, even though the adult was now calm and neutral in behavior. In the angry emoter condition, the infants had fewer positive facial expressions during the time when they were

allowed to explore the object. The results of this research suggest that infants can gather and retain information about how to interact with objects in their environment based on what they observe of the emotional reactions of others to these objects, even when the responses are not directed toward them.

Social referencing illustrates how members of a cultural group build a shared view of reality during infancy (Halberstadt & Lozada, 2011). Infants actively request information by looking to their mothers or other adults. They also eavesdrop on adults, watching and listening to the emotional tone of their interactions. The adult's expression, either positive or negative, cues the infant about whether to approach or withdraw. In an experimental study, it was demonstrated that infants could detect the stress level of their mothers, which in turn created heightened stress in the infants. This research illustrates the role of emotional reciprocity and potential



Emotions provide a channel of communication before speech and language. The exchange of playful laughing and smiling is an early form of conversation.

Myrleen Pearson/PhotoEdit