During the 1940s and 1950s, a number of emerging studies suggested that very young children, when separated from their mothers for a considerable period of time, proceed through a series of reactions that have become known as protest, despair, and detachment (e.g., Burlingham & Freud, 1944; Robertson, 1953). These or similar reactions were so common, despite variations in the care received by the child, that John Bowlby departed from the contemporary scientific and clinical consensus and decided that the loss of the specific mother figure was the most important factor in these reactions. From here, Bowlby went on to develop his “ethological–control systems” theory of the infant’s tie, or attachment, to his or her mother or primary caregiver (Bowlby, 1958, 1969/1982, 1973, 1980). In a partnership that went on to span nearly 40 years, Bowlby and Mary Ainsworth (1967; Ainsworth, Blehar, Waters, & Wall, 1978), among others, sought to answer questions such as the following:

Why does the young child become so distressed by the loss of his or her mother?

What processes account for each of the three phases of loss?

What is the bond that ties the child to his or her mother?

What are its forms, and how do they emerge?

And ultimately, how do we understand form and functioning “when things go wrong?”

Bowlby and his colleagues decided that answering these questions required a shift to the study of the early development of this bond in normally developing children and their families. They were convinced that only by understanding the normal formation and functioning of an attachment relationship would we be able to understand its malfunctioning. These efforts resulted in some of the most empirically and theoretically significant contributions to the study of children’s development in the second half of the 20th century. The theory that emerged was consistent with then-current theories of biology, embryology, cognitive science, and general systems theory. It was at the same time specific enough to incorporate species and cultural
differences, and general enough to incorporate species and cultural similarity. It came closer than any other theory to being equally applicable to questions of normative development and of individual differences and maladaptive developmental pathways.

Through the mid-1970s, there was much excitement and controversy about Bowlby’s theory of the ontogeny of attachment. However, by the 1980s, the field of attachment research had undergone a significant change: The study of individual differences had come to occupy so much of the focus that exploration of the ontogeny of attachment had nearly been abandoned. Ainsworth’s identification of three “primary” strategies of attachment (e.g., Ainsworth et al., 1978), Main and Solomon’s (1990) discovery of a “disorganized” pattern of attachment, and Main, Goldwyn, and Hesse’s (2003) research on adults’ attachment patterns have contributed enormously to our understanding of differential strategies within intimate relationships, as well as child and adult psychopathology. Ethological studies of behavioral development, however, point to the obvious but often ignored importance of survival of the individual at each developmental point. This will certainly be no less the case in the study of human attachment. Only by studying individual pathways through the course of development will we truly understand the origins, nature, and sequelae of the attachment bond.

Do we think that attachment behavior, and a secure attachment, are developmental tasks only of infancy, to be superseded by later tasks such as self-control and self-reliance (Garon, Longard, Bryson, & Moore, 2012), individuation (Kruse & Walper, 2008), autonomy (Beyers, Goossens, Vansant, & Moors, 2003), or independent and socialized behavior (Baumrind, 1980)? There are theoretical and empirical reasons for rejecting a strong developmental tasks position (Ainsworth, 1990).

Perhaps the most important reason for studying the developing forms of attachment behavior is related to common experience and to one of Bowlby’s most fundamental theoretical claims: that the biological function of attachment behavior is protection of the youngster from a variety of dangers. Preschool and even older children, in our present environment and in our “environment of evolutionary adaptedness” (Bowlby, 1969/1982), are vulnerable to a wide range of dangers. How children and their caregivers organize protective proximity and contact, and how they continue to use their caregivers as a secure base for exploration, remain as important during later periods of development as during the first year of life. Although the frequency of attachment behavior may wane across development, it remains as important when activated in a 4- or 8-year-old as it was during infancy. And how the attachment behavioral system is organized with other behavioral systems of the individual (and of the caregivers), such that the person is protected while exploring other developmental activities, becomes a crucial question for many developmental domains across the lifespan.

Bowlby (1969/1982) placed his theory of the development of attachment squarely within the biological, general systems, and cognitive sciences. The theory is actually an integration and elaboration of several conceptual schemes: general systems theory, including especially communication and control systems theory; cognitive science, much of which can be considered part of systems theory; evolutionary theory; ethology and the study of primate behavior; and descriptive studies of human infants and young children interacting with their caregivers. Our description of the development of attachment in childhood in this chapter presents Bowlby’s theory, along with the elaborations provided by several scholars regarding developmental changes during the preschool and early school age years. More detailed descriptions of attachment theory as applied to adolescence and adulthood are presented in the chapters in Part IV of this volume.

**General Systems Perspective**

At an abstract information–theoretical level, if a system is to survive, certain invariant conditions must be maintained, both among its constituent elements and in its relationship with its environment (Ashby, 1952, 1956). In particular essential respects, variety must be kept within certain limits or the system will not survive. If a system cannot control input from the environment in a manner that keeps these essential variables within the limits, then it must be “coupled” with another system that can keep the variety in the first system within the limits. In other words, there must be a close coupling, bond, or attachment between the two systems that serves to protect the less “self-reliant” system. This is a formal statement of Bowlby’s basic thesis regarding the biological function of child–parent attachment: It protects the child...
from a wide range of dangers—from either internal changes or environmental inputs—that would push some essential variable(s) beyond the system's (i.e., the child's) limits of survival.

In a system that develops toward increasing self-reliance over time, this coupling can have another aspect. In many biological organisms, the protective bond has a component that facilitates the youngster's tendency to explore and learn (i.e., to develop the skills needed for its autonomous integration into the larger group). Within this protective relationship, the developing organism thus becomes progressively less dependent for protection on the bond with its parent. Eventually, the developing organism obtains the necessary skills, within its coupling with its larger social context, to control internal change and environmental input in ways that stay within the limits necessary for survival. This complex developmental pattern constitutes the crux of Ainsworth's (1967) concept of the child's use of its mother as a haven of safety and secure base for exploration. It emphasizes that at each point in development, the attachment–caregiving interactions between the youngster and his or her attachment figure(s) compensate for, and complement, the lack of motor, cognitive, communication, and social skills on the youngster's part, such that the youngster is always protected while being afforded as much independence as possible to learn those skills. Finally, it suggests that at any given point in development, skills or behavioral systems across developmental domains will fit together in a manner that makes adaptive sense in terms of survival at that point.

**Bowlby's Control Systems Model of Development**

Research on both primates and humans indicates that this developmental pattern takes place in the context of a complex network of “affectional bonds,” including the close attachment of infant to mother. Ainsworth (1967) defines an affectional bond as a relatively long-enduring tie in which the partner is important as a unique individual, and noninterchangeable. Harlow was one of the first to propose distinct affectional systems or bonds (Harlow & Harlow, 1965), with the explicit contention that different bonds function to achieve different outcomes. Bowlby took this a step further in distinguishing among a number of behavioral systems, each with its own predictable outcome and biological function (see Cassidy, Chapter 1, this volume). Following on Harlow's early work, a number of distinct affectional bonds have been identified, including the attachment bond; the parent's complementary, caregiving bond; the sexual pair bond; sibling/kinship bonds; and friendship bonds (Ainsworth, 1990; see B. C. Feeney & Woodhouse, Chapter 36, and Zeifman & Hazan, Chapter 20, this volume). In our opinion, the essential contribution of Bowlby's theory is his description of the behavioral systems underlying these bonds, and the developmental changes in those behavioral systems.

**Behavioral Systems**

Attachment theory proposes a number of behavioral systems that are species-universal, although there may be (subtle) differences across both individuals and breeding populations (e.g., Freedman & Gorman, 1993). Each behavioral system consists of a set of interchangeable, functionally equivalent behaviors (i.e., behaviors that have the same predictable effect or outcome; Bowlby, 1969/1982). At the same time, each behavior serves more than one behavioral system. For example, locomotion serves, among others, the attachment, exploratory, and wariness behavioral systems. It is for this reason that Sroufe and Waters (1977) insisted that the infant's attachment behavior can be fully understood only from an organizational perspective.

A nonexhaustive list of behavioral systems would include those related to feeding, reproduction, caregiving, attachment, exploration, sociability, and fear/wariness. Following ethological theory, Bowlby proposed that the behavior patterns associated with each of these behavioral systems have been selected through evolution because they fulfill a biological function: They help to ensure the survival and reproductive success of the individual and his or her genes. The biological function of attachment behavior, and of wary behavior, is protection of the youngster from a wide range of dangers. The biological function of exploratory and sociable behavior is that of learning the skills necessary for more self-reliant survival, both in terms of individual skills and of smooth integration into the social group.

Behavioral systems include rules for the selection, activation, and termination of behaviors based on the individual's internal state and environmental context. As implied earlier, attachment researchers have focused on three specific behav-
ioral systems: attachment, fear/wariness, and exploration. Ainsworth (1990) and Marvin (1997) have suggested that it is useful to think of a fourth, the sociability behavioral system, which is related to children's friendly interactions.

Attachment theory proposes that in normal development, the operation of these four behavioral systems is affected by specific environmental and organismic events. They also exhibit a complex dynamic balance (Ainsworth, 1967), which has the predictable outcome of ensuring that the youngster develops more sophisticated coping skills, but does so within the protective bond to the attachment figure(s). Specifically, when the youngster's attachment and/or wariness behavioral systems are minimally activated, his or her exploration and/or sociability behavioral systems can easily be activated. Activation of the wariness system serves as a terminating condition for the exploration and/or sociability systems, and coincidently as an activating condition for the attachment behavioral system. Proximity or contact with the attachment figure, then, often serves to minimize activation of the attachment and wariness behavioral systems, which in turn can reactivate the exploration and/or sociability systems. This is part of the underlying control system for what Ainsworth (1967) described as “using the mother as a secure base for exploration.” Finally, as many mothers, fathers, babysitters, and child care providers know, a strongly activated exploration system can reduce activation of the attachment system.

There is some evidence that as the youngster develops through the preschool years, the organization among these four behavioral systems changes and becomes more elaborate (e.g., Greenberg & Marvin, 1982). There is also some evidence that in young children raised in environments extremely dissimilar from the “environment of evolutionary adaptedness” (e.g., in a maltreating or institutional setting without consistent caregivers), these four behavioral systems often do not exhibit this equilibrated organization, leading to what could appropriately be called a developmental disorder (e.g., O'Connor et al., 2003; Rutter et al., 2012; Zeanah, Smyke, Koga, & Carlson, 2005; see review by Dozier & Rutter, Chapter 30, this volume).

**Complexity of Behavioral Systems**

Drawing from ethology, Bowlby (1969/1982) proposed that behavioral systems differ not only in function but also in their structural complexity. The simplest is a reflex—a highly stereotyped behavior activated by a stimulus at a specific threshold and carried to completion. A more complex behavior, called a fixed action pattern by ethologists, is also a highly stereotyped behavior activated and terminated by specific stimuli, but its threshold for activation varies according to the state of the organism, and it often makes use of some feedback from the environment during its execution. Many of the basic attachment behaviors that Ainsworth (1967) identified, such as grasping, crying, and smiling, might also be considered fixed action patterns.

Although seemingly quite primitive, these simple behavior patterns can assume an elegant complexity when placed in the context in which they evolved. In the case of attachment behavior, the context is one of close proximity to a caregiver who responds with specific behaviors that complement the infant's behavior. The immediate effect of many behaviors is to bring about a change in the environment that serves as an activating condition for another behavior, often forming a lengthy sequence with an eventual outcome that is necessary for the individual's survival. For example, when a hungry neonate cries, that behavior predictably activates the maternal behavior of picking the infant up and placing it at the breast. The pick up, or at least the stimulus of the breast or nipple on the infant's face, terminates the cry and activates rooting. This predictably brings the infant's mouth in contact with the nipple, which serves as a terminating condition for rooting and an activating behavior in the baby a condition for grasping the nipple with its lips. The stimulus of the nipple in the mouth, in turn, activates sucking, and finally liquid in the mouth stimulates swallowing. Whereas the complexity and predictability of this sequence might appear purposeful, goal-directed—or to use Bowlby's term goal-corrected—on the part of the infant, in fact it is not. Interruption of the sequence at any point would lead to failure of the overall sequence. Instead, Bowlby referred to these behaviors as having a specified “predictable outcome,” as long as the behavior is executed in an environment similar to the one in which the behavior evolved. The predictable outcome of attachment behaviors more generally is proximity and/or contact with a caregiver/attachment figure. This construct of a predictable outcome is especially important for at least two reasons. First, it allows us to understand relatively simple forms of behavior as achieving an important outcome without our inferring that the youngster executed the behavior intentionally, despite the fact that the behavior sequence occurs in a predictable way.
Second, it forces us to view these simple behavior patterns as taking place in a dyadic or larger context: They have little meaning if they are not described and understood in the relationship context in which they evolved.

A yet more complicated pattern of behavior is a goal-corrected pattern. As with simpler forms of behavior, goal-corrected behaviors have activating and terminating conditions, as well as predictable outcomes, but they achieve the outcome through a more sophisticated process. In order to engage in goal-corrected behavior, an organism must have an especially complex, dynamic, internal representation of relevant aspects of self, his or her behavior, the environment, and the object or person toward whom the behavior is directed. Bowlby used the term internal working model (IWM) for these representations, but he also referred to them as “representational models,” which are loosely equivalent to Piagetian “schemas.” IWMs are not static images, but flexible models that are used to understand and predict one’s relations with the environment, and to construct complex sequences of behavior based on plans that can achieve specific, internally represented outcomes. Studies of the early parent–child relationship have identified crucial moments in the sequence of actions during a goal-directed exchange. Specifically, the moment of repair in a mismatched exchange carries the most crucial information to both parent and child (Kogan & Carter, 1996). For example, when the neonate cries in the night, signaling that she is cold, her distress may increase when she is exposed to check for a soiled diaper, as may her parent’s distress at failing to soothe her cry; both experience relief when settled in for a snuggle, warming the cold baby and reassuring the caregiver. When a goal-corrected behavior sequence is activated, the child continuously orients his or her behavior and selects alternative behaviors, based in part on the feedback received from the effects of the behavior. When the set-goal is achieved, the perceived discrepancy between the set-goal and the organism’s state is reduced to zero, and the behavioral plan terminates.

Drawing again from the work of the ethologists, Bowlby (1969/1982) proposed that there are variations in how behaviors, and behavioral systems, are coordinated into more complex wholes. Among them are the following:

1. Very simple behaviors can be coordinated in chain-linked sequences, with the terminating condition for one behavior serving as the activating condition for the next.

2. There can be chains with alternative links. In this case, when one link in the chain fails to achieve an outcome that activates the next link in the chain, some other link is activated in a non-goal-corrected manner. For example, studies employing the still-face paradigm describe infants who respond to an unavailable caregiver by switching behavior by similarly increasing their distress cues or by disengaging (Mesman, Van Ijzendoorn, & Bakermans-Kranenburg, 2009; Toda & Fogel, 1993).

3. Complex, goal-corrected behavior patterns can themselves be organized together in chain-linked sequences, with the terminating condition for the first goal-corrected pattern serving as the activating condition for the second.

4. An action based on one behavioral system alternates with an action based on another system. Ethologists have found that these complex sequences often form the basis for important social interactions and communicative signals.

5. Partially executed behaviors from one behavioral system can occur simultaneously with partially executed behaviors from another, conflicting behavioral system.

### Ontogeny of Behavioral Systems

The final step in laying the groundwork for Bowlby’s model of the ontogeny of attachment is to outline the three processes that he proposed as basic to development in general. First, the early forms of behaviors are sometimes directed toward different objects in the environment than those to which the mature form will be directed later in development. Usually, the range of stimuli that elicit a particular behavior becomes restricted over the course of development. Second, behavioral systems that are functional early in development are often of a very simple type. Over the course of development, these simpler systems tend to become superseded by more complex, sophisticated ones with correspondingly complex IWMs. Third, whereas some behavioral systems are functional in simple form early in development, others start out being executed only partially, in a nonfunctional way, or in an inappropriate place in a behavioral sequence. In this case, the important developmental process is the integration of these nonfunctional components into functional wholes.

One of the most important implications of this third process is that once a behavioral system has become organized, it assumes some inherent stability (Ashby, 1956; Thelen & Ulrich, 1991).
It may maintain the same organization even if it has developed along nonfunctional lines and may persist even in the absence of the conditions in which it developed. This part of the developmental model has clear implications for the study of developmental psychopathology. However, it also has important implications for more adaptive development, in suggesting both that there may be systemic, structurally based sensitive periods in development, and that beyond a certain point in development, it may be especially difficult—albeit not impossible—for a developmental process or outcome to take shape in a “normal” fashion.

The Ontogeny of Attachment

Development of Attachment during the First Year of Life

Bowlby proposed four phases in the development of the attachment behavioral system, with the first three occurring during the first year of life, and the fourth beginning sometime around the child’s fourth birthday.

Phase I: Orientation and Signals without Discrimination of Figure

Consistent with much new research of the 1960s, Bowlby proposed that immediately or very soon after birth, the baby’s signal and motor systems are especially adept at eliciting interest and caregiving from other humans, such that proximity, physical contact, nutrition, and warmth are the predictable outcomes. In this sense, the development of the infant’s attachment behavior cannot be fully understood except as taking place in the context of the complementary behavior of his or her caregivers. An extensive body of research focuses on caregiving-as-context for many domains of development, and thorough consideration of these caregiving behaviors and their developmental changes is beyond the scope of this chapter (but see, e.g., Britner, Marvin, & Pianta, 2005; George & Solomon, 1996; B. C. Feeney & Woodhouse, Chapter 36, this volume).

During this first phase in the development of attachment, baby and caregiver engage in interactions of many types, and from the perspective of the caregiver’s behavior, many of these interactions are goal-corrected. From the perspective of the baby’s own behavioral organization and control, there are predictable outcomes, rather than set-goals, of the behaviors. Thus, during Phase I, the infant’s IWMs are present but primitive and are probably limited to internal “on again, off again” experiences associated with the activation and termination of individual behaviors. In this sense, the functioning of the young infant’s IWMs are no more separate from actual behaviors than in Stage I of Piaget’s (1952) theory of the sensorimotor period.

At birth or very soon thereafter, every sensory system in the infant is working and continues to improve in functioning. Among the sensory systems especially important in the development of attachment behavior are the auditory and visual systems. At or soon after birth, most infants are capable of visual orientation and tracking, and are especially responsive to contour and pattern, especially if the stimulus is moving slowly. By 4 weeks of age, most infants exhibit a preference for looking at the human face compared to other objects (Wolff, 1969). Very soon after birth, infants tend to quiet and attend to soft auditory stimuli and appear especially responsive to the human voice. Infants, and even full-term fetuses, recognize and prefer their own mother’s voice to that of a stranger (Kisilevsky et al., 2003). During this first phase, each of these systems has its own activating and terminating conditions, and there is as yet no “internal” connection between the systems. Reaching, grasping, and clinging are also crucial attachment behaviors in all primates, and they develop relatively late in humans. It is not until after about 2 months of age that the human infant’s grasp is highly developed and controlled by anything other than a reflex-like process of activation by stimulation of the palm of the hand. It is at about this same time that the visual system becomes chain-linked with the motor system in a manner allowing the infant to make ballistic-like movements toward an object in the visual field. Finally, smiling and crying are additional, important attachment behaviors displaying a similar developmental course. Smiling tends to be activated, and crying terminated, in a relatively automatic way by a range of specific conditions. These conditions become increasingly selective and integrated within more complex behavioral systems over the first 6 months.

Thus, at first it is largely the caregiver who maintains proximity and protects the infant, although the newborn is equipped to be especially responsive to other humans and to elicit caregiving and affection from them. Over the course of the first weeks of life, these patterns of infant-
caregiver interaction are repeated frequently. If the caregiver's initiations and responses are well attuned to the infant's behaviors (i.e., if the baby's attachment behaviors are predictably terminated by the caregiver's behavior), then stable patterns of interaction are established. These reciprocal patterns of caregiver–infant behaviors ultimately minimize the frequency and intensity of attachment behaviors such as crying, and more readily elicit other behaviors, such as visual orientation and smiling. In this context, the infant is seen as establishing its own behavioral and autoregulatory rhythms (e.g., Stern, 1985), so that stable “internal” and dyadic rhythms are established.

Bowlby (1969/1982) proposed that in the environment of evolutionary adaptedness, Phase I lasts from birth to sometime between 8 and 12 weeks of age, roughly coinciding with early developmental trajectories for crying in human and nonhuman primates and of dramatic neurobehavioral and sensory developments (Brazelton, 1962; Marshall, 2011). He suggested, however, that under unfavorable conditions, this phase can last much longer.

**Phase II: Orientation and Signals Directed toward One or More Discriminated Figures**

The shift from Phase I to Phase II is gradual, and it takes place earlier with some attachment behaviors and complex attachment behavior patterns than with others (Ainsworth, 1967; Bowlby, 1969/1982). Three related issues are important in defining this transition.

First, during Phase II, there is an elaboration of simple behavioral systems into more complex ones. The simple behavioral systems of the Phase I infant become integrated within the infant into complex, chain-linked behavioral systems. The primary focus here is on the control of the individual systems. Whereas in Phase I, the caregiver provided the conditions for terminating one behavioral link in a chain and activating the next, during Phase II, the infant assumes much of this control. Many of the sensorimotor advances of the 3- to 6-month-old infant illustrate this shift in behavioral control. For example, as early as 3 months of age, perception of the bottle or breast initiates more of the interaction and being able to exert more control over the interaction through increasingly complex chain-linked behaviors.

The elaboration of chain-linked behavioral systems, and the infant's increasingly differential attachment and sociable behavior, may also have important implications for describing the distinct developmental pathways toward the individual differences in patterns of attachment that Ainsworth discovered (e.g., Ainsworth et al., 1978), and found to be applicable to preschoolers (Cassidy & Marvin, 1992; Etzion-Carasso & Oppenheim, 2000), young school-age children (Bohlin, Hagekull, & Andersson, 2005; Main & Cassidy, 1988), and adults (Bakermans-Kranenburg & Van IJzendoorn, 2009; Main, Kaplan, & Cassidy, 2003; Tronick, 2007).
NEW ATTACHMENT BEHAVIORS

Locomotion provides the infant with not only a vastly increased ability to control proximity to the attachment figure, to move off to explore, to expand his or her horizons in innumerable ways, but also to place himself- or herself in significant danger. In fact, four of the six additional attachment behaviors that Ainsworth (1967) identified are based on this newly developed motor skill. Ainsworth observed these behaviors as differential approach to mother, especially on reunion or when distressed, at 28 weeks; differential following of the mother when she leaves the room at 24 weeks; use of the mother as a secure base for exploration (making exploratory excursions from her, returning to her from time to time, and terminating exploration and attempting to regain proximity if she moves off) at 28 weeks; and flight to the mother as a haven of safety when alarmed at 34 weeks. Two other attachment behaviors to emerge during this same period depend less directly on locomotion (Ainsworth, 1967): differential burying of face (while climbing on the mother; or after an excursion away from her, the infant buries its face in the mother’s lap) at 28 weeks; and differential clinging to the mother when alarmed, ill, or distressed at 43 weeks. By 6–8 months, the baby is able to cling to the caregiver in a rather automatic way as its attention is directed elsewhere.

INFORMATION PROCESSING AND IWMs

A second, revolutionary change associated with the shift to Phase III is an elaboration of the infant’s cognitive skills. Some of the systems mediating a child’s attachment behavior and many of the earlier, chain-linked behaviors become organized under the infant’s intentional control. Bowlby suggested that the Phase III infant has an internal image of a “set-goal” he or she would like to achieve (e.g., physical contact with the attachment figure). The infant can now: operate internally on available behaviors (i.e., a plan) and select behaviors that are likely to achieve that set-goal (e.g., crawl around the sofa to mother); execute the plan; alter it as a function of feedback; then terminate the plan when the discrepancy between the set-goal and the infant’s perception of his or her position is reduced to zero.

This describes, in “control systems” terminology, what traditional cognitive theorists have referred to as the infant’s newly emerging ability to differentiate means from ends. The ability to...
organize attachment behavior on a goal-corrected basis also implies that the infant now has an internal image of the attachment figure that is independent of perception (object permanence). In a rather elegant longitudinal study, Bell (1970) demonstrated the parallel (in Piaget's terms, the "horizontal decalage") between the development of object permanence, person (mother) permanence, and the onset of goal-corrected proximity seeking. Consistent with the proposition that children will develop such a general purpose skill first in relationship-based and emotionally salient contexts, Bell found that most infants developed person permanence before object permanence. An active debate endures, however, on the human- or object-first hypotheses (e.g., Bonatti, Frot, Zangl, & Mehler, 2002).

The baby's set-goal in interactions with the attachment figure will vary because sometimes the set-goal will be to maintain some distance from the attachment figure while the infant explores the social and physical world. At other times, it will be mere proximity, or nothing short of close physical contact. What "setting" his or her goal takes at any given time is the result of many factors, including physiological state (e.g., hunger, fatigue); the presence or absence of an alarming event in the environment; assessment of the caregiver's attention to him or her; and whether the caregiver is present, departing/absent, or returning from an absence (Bowlby, 1969/1982). It will also depend on the dyad's history of relatively stable patterns (i.e., individual differences) of attachment–caregiving interactions.

**COMMUNICATION SKILLS**

Concurrent with these locomotor and cognitive changes are those in the infant's verbal and nonverbal communication skills. During Phase II, the infant displays increased visual and vocal engagement with others, much of which is of a turn-taking, prelanguage format to which caregivers tend to respond as if it were intentional (Bruner, 1981; Heimann et al., 2006). During Phase III, the infant uses communicative signals in a goal-corrected manner as part of a repertoire of plans for achieving a set-goal that often involves regulating the behavior of others for purposes of requesting or rejecting actions or objects; attracting or maintaining another's attention; and/or establishing/maintaining joint attention for purposes of sharing an experience (Bruner, 1981). At first through the infant's display and understanding of nonverbal utterances and signals, later through single-word utterances, and still later (18–36 months of age) through complex verbal communication, youngster and caregiver(s) are able to alter each other's behavior indirectly by directly altering each other's set-goals (Marvin, 1977).

All these changes have important implications for the Phase III baby's internal working models. At this point, the baby has separate models of caregiver(s) and of self. These consist of images and plans ordered in some form of a hierarchy—or event schemas or scripts (Stern, 1985)—of self and other. The content of the infant's IWMs are probably derived from some combination of the stable, chain-linked sequences of interaction already developed with the caregiver(s) and the newly stabilizing patterns that emerge with the motor, cognitive, and communication skills that develop during Phase III. The likely more elaborate content of infants' IWMs is also echoed in psychosocial theories of development, as Erikson (1950) proposed that the cumulative sense of trust or mistrust an infant builds across the first year relates to both a sense of confidence in the caregiver and a sense of confidence in the self as an effective agent in social exchanges—the later being a clear parallel to developing schemas or IWM. Indeed, Pittman, Keiley, Kerpelman, and Vaughn (2011) suggest that attachment history—with its foundation in infancy—provides the context for identity formation.

In Phase III, the infant's IWMs remain primitive in at least two ways. First, the infant is limited to thinking about caregiver and self only in terms of caregiver behaviors. The infant has yet to comprehend that the attachment figure has unique perceptions and goals, and that these can differ from his or her own. Second, the infant is unable to think about behaviors in terms of long sequences. The infant's ability to operate in this internal fashion is limited to individual goal-plan hierarchies, or event schemas, with each thought activated and terminated by specific stimuli.

**THE EXPLORATION SYSTEM**

The fourth important change that takes place during Phase III is especially related to the changes in the infant's locomotor and cognitive changes (i.e., the elaboration of his exploration behavioral system). The development of locomotion and of object permanence, the more sophisticated un-
understanding of mean–ends relations, the ability increasingly to organize exploration on the basis of goal-corrected behavior, and emerging imitation and conversational skills (e.g., Piaget, 1952) all enhance the infant’s ability to learn about the physical and social environment, to test and learn the “rules” that govern those interactions, and to categorize those interactions symbolically and linguistically.

THE SOCIABILITY SYSTEM

Closely related to the exploration system is the infant’s sociability system. Although there appear to be individual differences related to both temperament and relationship history in Phase III infants, infants in this phase are likely to stop exploration when confronted by a strange person, remain wary (or even fearful) for some moments, and either remain stationary or move away from the stranger and toward the attachment figure. After some few moments, if the stranger displays positive affect, is not intrusive, and matches his or her responses to the infant’s behavior, the infant is likely to interact sociably, with rapidly decreasing wariness (e.g., Bretherton & Ainsworth, 1974).

THE WARINESS SYSTEM

The fifth and final major Phase III change involves the infant’s wariness behavioral system. Wariness toward novel, and especially sudden, nonhuman events has obvious survival value. What is less obvious is the nature, developmental course, and role played by wariness toward unfamiliar humans. Despite the earlier bias toward responding to human stimuli, during the last quarter of the first year, infants increasingly are more wary of unfamiliar adults (Bretherton & Ainsworth, 1974). Although there may be individual and reproductive gene pool differences in temperamental reactivity to strangers (e.g., Kagan, & Fox, 2006), this developmental shift appears to exist whether the infant is raised in a culture in which the norm is single or multiple caregivers (cf. Ainsworth, 1967).

Reciprocal linkages among the older infant’s wariness, sociability, and attachment behavioral systems are more obvious and predictable than they were earlier. If the wariness system is highly activated, the infant tends to retreat to the parent as a haven of safety; if it is not, the infant may continue to stare at a nonintrusive stranger, or may initiate or respond sociably. In many cases, one can see a cycling of conflicting behavioral systems, with the infant moving back and forth from parent to stranger, as the distance from each tends to activate one system and terminate the other.

SENSITIVE PERIODS

That infants become more, rather than less, wary toward unfamiliar humans over the period from 6 to 18–24 months of age, is important for at least two reasons. First, infants are vulnerable to danger from other humans, and until they are more able to predict which individuals are dangerous, it is adaptive that their initial reaction be wariness. Second, one of the developmental mechanisms involved in the consolidation of infants’ attachment is the reduction in the range of individuals able to activate and terminate infants’ attachment behavior (Bowlby, 1969/1982). The infant more and more comes to approach familiar caregiver(s) and to retreat from unfamiliar individuals of the same species. In its general form, this phenomenon is characteristic of many species and is common in the study of “sensitive periods” in development (Bateson, 1976; Knudsen, 2004; Marvin & Britner, 2008).

Bowlby (1969/1982) suggested that the readiness to become quickly attached remains intact at least through the end of the first year. This does not imply that the specific attachment, a more versus less adaptive form of attachment, or the lack of an attachment, is completely irreversible after this sensitive period. The results from studies of infants placed in foster care, or raised in East European orphanages and adopted into low-risk homes, suggest that children can form discriminating or selective attachments for the first time well after 1 year. However, infants placed in foster care after 12 months of age have been found to be more rejecting toward their new caregivers than younger infants (see Dozier & Rutter, Chapter 30, this volume). And contemporary studies of children adopted from orphanages (e.g., O’Connor et al., 2003; Rutter et al., 2012) increasingly indicate that these children form attachments, but that those attachments are at increased risk of being organized in a significantly less adaptive manner than would be expected given that they are being raised in a low-risk home.

ORGANIZATION AMONG BEHAVIORAL SYSTEMS

It is during Phase III that the dynamic balance described earlier among the four behavioral systems
fully emerges (Ainsworth et al., 1978). For most infants, this balance culminates in organizing the new developments of this phase into what Ainsworth (1990) referred to as the “hallmark” of an attachment—the infant’s use of the attachment figure as a secure base for exploration. Stable variations in this organization are evident in the different insecure strategies of attachment (Ainsworth et al., 1978; Main & Solomon, 1990). In the case of the “avoidant” strategy, the infant tends, when the attachment system is highly activated, to inhibit attachment behavior and (often) activate the exploration system. In the “resistant” strategy, the infant tends to overweigh the attachment and wariness systems. In the case of infants classified as having a “disorganized” attachment, the simultaneous and/or sequential activation and termination of behavioral systems are especially contradictory and take a form that puts the infant at risk of not being protected (e.g., with activation of the attachment system also serving to activate wary behavior toward the caregiver).

**Subordinate Attachment Figures and Types of Relationships**

Throughout human evolution, children have been raised in families, which themselves are part of larger groups of varied size and composition. Most children have experienced multiple caregivers, giving them the opportunity to form specific attachments to a number of figures. Even in his early writings, Bowlby (e.g., 1958) proposed that infants tend to become attached to a number of caregivers, and that “for a child of 18 months to have only one attachment figure is quite exceptional” (Bowlby, 1969/1982, p. 304).

Several studies across many cultures have suggested that a majority of infants select more than one attachment figure almost as soon as they begin to show any differential attachment behavior, whereas a majority do so by 18 months (e.g., Ainsworth, 1967; Konner, 1976; Schaffer & Emerson, 1964). These and other studies (e.g., Myers, Jarvis, & Creasey, 1987; Umemura, Jacobvit, Messina, & Hazen, 2013), however, suggest that not all attachment figures are treated by the infant as equivalent. Infants are attached to a range of caregivers; however, attachment behavior, especially when the infant is distressed, hungry, tired, or ill, tends to be focused on a particular person when both that person and other attachment figures are available. Thus, most infants seem to have a network of attachment figures, but the available data suggest that they may tend to choose one figure as the “primary” attachment figure. Importantly, others may be chosen as the primary figure for play or other types of interactions (see Messman, Van IJzendoorn, & Sagi-Schwartz, Chapter 37, this volume).

**Development of Attachment during the Toddler and Preschool Years**

Most research on social and emotional development during the postinfancy preschool period has focused on issues other than attachment—for example, autonomy, self-control, independence, and socialization. These issues imply a decline in attachment behavior, as the child deals with these later “developmental tasks.” Although the framework of developmental tasks can be helpful in guiding our research, it can also lead us astray by restricting the focus to single issues. A full understanding requires viewing development across multiple domains. In fact, while the child is becoming more autonomous and self-reliant during the preschool years, he or she remains vulnerable to a range of dangers. The child makes increasingly distant forays from the attachment figure while exploring the environment but is still at an early point in developing the skills needed for self-protection. The close attachment to the caregiver thus remains crucially important to the child’s survival and socialization. The close attachment to the caregiver thus remains crucially important to the child’s survival and socialization. It is adaptive, rather than “regressive,” that attachment behavior remains easily activated.

As we move to the study of attachment in the postinfancy years, we must also be careful not to lose the focus on behavior as the child’s representational and communicative abilities become increasingly noticeable. Because infants’ mental models of attachment cannot possibly be symbolic (i.e., language-based), it must be assumed that those cognitive structures that relate to attachment behavior in infancy constitute the mental model (Bretherton, 1993). There is a natural shift in research on attachment past infancy to move to the level of cognitive–emotional representation. The trap is to move to the cognitive level to the relative exclusion of behavior. This would be a terrible error. Bowlby’s whole theory—or the cognitive-behavioral part of it—is based on the important linkage between IWMs and behavior. The point is that older children do not move from the level of behavior to the level of internal representation: They become able to process and manipulate plans and goals at that internal level, and
increasingly to control behavior with that internal processing. We must remember that the function of an IWM is to organize behavior in more flexible ways.

Changes in Attachment Behavior during the Toddler/Preschool Years

Although most of our knowledge about the ontogeny of attachment behavior is restricted to the first 12–15 months of life, a few naturalistic studies (e.g., Blurton-Jones, 1972; Konner, 1976; Lyons-Ruth, Connell, Zoll, & Stahl, 1987) and a number of laboratory-based studies (e.g., Main & Cassidy, 1988; Marvin, 1977; Marvin & Greenberg, 1982; Mittal, Russell, Brittnner, & Peake, 2013; Russell, Londhe, & Brittnner, 2013) provide a general outline of the normative course of attachment behavior over the preschool and early school years. In reviewing the literature, Bowlby (1969/1982) suggested that during the second and most of the third year of life, attachment behavior is shown neither at less intensity nor less frequency than at the first birthday. In fact, use of attachment figures as a secure base is a critical component of the child's rapidly expanding physical and social world, and attachment behavior therefore remains a major part of his or her behavioral organization.

Overall, 2-year-olds tend to maintain as much, or more, proximity to their mothers as do 1-year-olds. At the same time, they also make more extensive excursions away in order to explore with their more elaborate cognitive and motor abilities. Several studies (e.g., Schaffer & Emerson, 1964) have found that toddlers tend to monitor actively not only the mother's movements but also her attention. When she is not attending to him or her, the child often executes attachment behavior with the set-goal of regaining her attention. This adaptive behavior pattern is sometimes unappreciated in Western cultures, in which it is commonly seen as regressive or controlling “attention seeking” and as frustrating to parents.

Before the third birthday, children are not very adept at maintaining proximity when their attachment figure is moving. The perception of the caregiver moving off is typically a condition that terminates the toddler's exploratory behavior and activates attachment behavior. At this younger age, children can follow the caregiver around the familiar home but find following the caregiver difficult if he or she is moving steadily away from the child. In this situation, one or both members of the dyad initiate physical contact, and the toddler is carried. After the third birthday, with much improved locomotor skills, the child is much less likely to be carried under relaxed circumstances.

When undergoing a separation from the mother that is not of their own initiative, 2-year-olds tend to be as distressed as 1-year-olds, although they are more able to rely on calling and active search behaviors rather than crying. Many 3- and 4-year-olds also become mildly upset by such brief separations, but less so than 2-year-olds, and they are more willing than younger children to be left for brief periods in the company of friendly adults. By the third birthday, it appears that it is being left alone that is especially upsetting and likely to elicit strong attachment behavior. If briefly left alone, or if mildly distressed by being left with a friendly adult, most 3- and 4-year-olds are able to wait for the attachment figure's return before executing attachment behavior (Marvin, 1977). For a more detailed review of changes in preschoolers' responses to separations, proximity seeking and contacts with their caregiver, and the organization of the attachment system, see Marvin and Brittnner (2008).

Research by Marvin (1977; Marvin & Greenberg, 1982) and Cassidy (Cassidy et al., 1992; Main & Cassidy, 1988) suggest the importance of Bowlby's (1969/1982) proposed final phase in the development of attachment, the “goal-corrected partnership.” They are also congruent with earlier research suggesting that sometime around age 4, children are much less dependent on physical proximity and contact with their attachment figure(s) to maintain a sense of security and are increasingly comfortable spending appreciable periods of time in the company of nonfamilial peers and adults (Blurton-Jones, 1972; Konner, 1976). In the following sections, we briefly review literature on other developmental domains relevant to the changes in attachment behavior outlined earlier, then review the theoretical and empirical work on the goal-corrected partnership.

Developmental Changes in Relations among Behavioral Systems

Ainsworth and colleagues (1978) showed how, in 1-year-olds, the attachment, exploration, wariness, and sociability systems function in the dynamic equilibrium described earlier. Observation of young children's behavior when they are introduced to a friendly adult stranger presents an excellent opportunity to study this dynamic balance, and it has yielded some evidence that this organi-
rationalization changes over the preschool years in a way that is consistent with the youngster's gradually increased responsibility for self-protection based on increasingly sophisticated behavioral organization.

Greenberg and Marvin (1982) studied young children’s initial reactions to a friendly stranger. The most common response among 3- and 4-year-olds was to (apparently) ignore the stranger and continue exploring, without activation of either the wariness or attachment behavioral systems. The next most common response was the simultaneous activation of the wariness and sociability systems (usually in the form of coy expressions) and coincidental activation of the attachment system. No 2-year-olds displayed this more complex pattern. Most children of all three ages eventually played sociably with the stranger. Whereas a few of the younger children remained fearful of the stranger throughout the situation, none of the older children did so. Finally, all 2-year-olds (but none of the 3- or 4-year-olds) who displayed wariness toward the stranger while the mother was gone also displayed attachment behavior toward the mother when she returned. Greenberg and Marvin suggested that this decreased developmental coupling of the wariness and attachment behavioral systems, and the increased developmental coupling of the wariness and sociability systems, could have important implications for children’s increasing ability to cope with strangers on their own: The careful approach implied by the coincidental activation of the wariness and sociability systems could provide the basis for strategies of social interaction that could fulfill the same protective function earlier fulfilled by the close physical bond between the child and his or her attachment figure(s).

Changes in Locomotor and Self-Care Skills

Humans exhibit a developmental organization during the preschool years that suggests the crucial importance of a continuing protective attachment, while at the same time providing the young child with the independence necessary to learn the skills that will be required during the following phase. Milk teeth are completed between ages 2 and 3 years, and by 3 years children are quite independent in feeding themselves. Although Western cultures are now clearly different, in less industrialized cultures, breast feeding tapers off between 3 and 4 years of age. By age 3, the child’s locomotor skills have developed to the point that he or she can assume much of the responsibility for gaining and maintaining proximity to the attachment figure under most conditions, as well as engage in vigorous play with other children and practice many of the social skills he or she will use in a over the next decade. By the beginning of the school-age period, the child is capable of most of the motor skills of older children, although strength, endurance, coordination, etc. continue to improve.

Changes in Communication Skills

It is during the preschool period that children develop most of the communication skills that will later be required for stable integration into their social group(s), independent of the close physical tie to their attachment figure(s). By 30 months, children increasingly communicate about past and future events and emotional states, and connected narrative discourse emerges as children begin to relate logical sequences of events across many utterances (e.g., Breherton, 1993; Dunn, 1994). Dunn (1994) found that during the second and third years, children are increasingly able to recognize, understand, and converse about the feelings and behaviors of other family members; they comfort, tease, argue, joke, and blame. She concluded that by 3 years of age, children understand surprisingly complex rules for social interaction, interpret others’ feelings and goals, and use such rules to manipulate others’ internal states. It now seems clear that by age 4, most children are becoming competent at one of our species’ most sophisticated communication skills: thinking and conversing about the feelings, goals, and plans of others with whom they are interacting (see Hughes & Leekham, 2004). This skill, indicative of children’s developing theory of mind, should have important implications for the organization of attachment interactions.

Although there has been little recent research on the ontogeny of nonverbal expressions in preschool children, some of the early work in human ethology (Blurton-Jones, 1972; Hinde, 1976) suggested that many of the expressions used to regulate interactions during childhood and adolescence develop during the preschool years. Furthermore, studies of coy expressions (Marvin, 1997) and of posed expressions of happiness, surprise, anger, fear, sadness, and disgust (Lewis, Sullivan, & Vasen, 1987) again suggest that the period between the third and fourth birthdays is especially important in the developmental elabo-
attentive and understanding of a range of complex expressions used to regulate interactions.

**Changes in Information-Processing Skills and IWMs**

Extensive research, including the work of Bretherton (1993), Callaghan and colleagues (2005), Cassidy and Marvin (1992), Dunn (1994), Stern (1985), and Ziv, Oppenheim, and Sagi-Schwartz (2004), suggests that during the second through sixth years of life, children are developing sophisticated and accurate (in the sense of nonegocentric) IWMs of their own, and of others’ behavior and internal experiences. At the same time, they are developing surprisingly sophisticated IWMs of implicit and explicit rules for social behavior and interaction. The reader is referred to the studies listed earlier, and to other chapters in this volume (particularly Bretherton and Munholland, Chapter 4) for information about the content of, and individual differences in, these IWMs, and to Marvin and Britner (2008) for details on developmental changes in their underlying form.

**Phase IV: Implications of the Partnership for the Organization of Attachment Behavior during the Preschool Years**

Although this partnership is certainly a general purpose skill used in interactions with family members, other adults, and peers, it is likely that it will first be applied in emotionally powerful interactions such as attachment–caregiving interactions. Marvin (1977) and Marvin and Greenberg (1982) studied its application to this type of interaction and suggested two important organizational changes. The first is related to the young preschooler’s ability to inhibit attachment behavior and insert the caregiver’s plans into the child’s own plan for proximity, resulting in what might be called the “emergent partnership.” The second is related to the older preschooler’s ability to operate internally on the goals and plans of self and other simultaneously, to understand objectively (i.e., nonegocentrically) the causal relations between the caregiver’s goals/plans and behavior, and to engage in goal-corrected negotiations with the caregiver regarding a shared plan for proximity, forming a goal-corrected partnership.

With regard to the first organizational change, Bowlby (1969/1982) proposed that a toddler’s attachment plans vary in the extent to which they are designed to influence the behavior of the attachment figure. He suggested that the earliest goal-corrected plans for changing the caregiver’s behavior are primitive (e.g., pushing her in certain directions, knocking a book off his lap, throwing a tantrum). These early attempts are based either on changing the caregiver’s behavior directly through physical means or indirectly, through crying and anger. During this same period, parents rely largely on techniques such as distracting the toddler to influence his or her behavior.

As the dyad’s conversational skills become elaborated, and as the child develops self-control, it should become increasingly the case that child and mother are able to change each other’s behavior through linguistic communication. Although the child cannot yet negotiate a shared plan with the caregiver in a goal-corrected manner, the child can attempt to change the caregiver’s goal or plan, inhibit ongoing behavior, insert one of the caregiver’s goals into his or her own plan for action, and thus function in an interaction that has the “predictable outcome” of shared goals.

Marvin (1977) provided an initial test of this hypothesis by administering two analogous procedures to a sample of 2-, 3-, and 4-year-old children, one relevant to interaction in a nonattachment context (i.e., a waiting task), and the other in an attachment–caregiving context (i.e., the Strange Situation). The results of both procedures suggest that by 3 years of age, most children are able to inhibit ongoing, goal-corrected behavior across at least two types of interactions, insert one of mother’s communicated goals into their own plan, and wait until the circumstances are appropriate for both mother and child before executing their plan.

The results also suggest a further change in the organization of attachment behavior sometime around the fourth birthday. The hierarchical reorganization of the older preschooler’s IWMs and information-processing skills that enables the child to operate in a nonegocentric fashion simultaneously on the perspectives of self and others, and in a goal-corrected manner to construct shared plans with the caregiver, should have important implications for the organization of attachment behavior. Marvin (1977) suggested that at least five component skills are involved: (1) the ability to recognize that the attachment figure possesses internal events including thoughts, goals, plans, feelings, and so forth; (2) the ability to distinguish between the caregiver’s point of view and one’s own, especially when they differ; (3) the ability to infer, from logic and/or experience, what factors control the caregiver’s goals and plans; (4) the ability to assess the degree of coordination, or...
that attachment becomes increasingly difficult to measure as it becomes more sophisticated, more abstract, and less dependent on proximity and contact, as the behavioral systems becomes elaborated into more and more complex systems (Bowlby, 1969/1982). For a detailed account of the course of these developmental changes, see Marvin and Britner (2008), as well as the relevant developmental chapters in this volume.

**Conclusion**

Attachment theory began with Bowlby’s (e.g., 1958) attempt to understand the psychopathological effects of maternal deprivation by studying the normative course of the ontogeny of this earliest relationship. Bowlby’s hope was that if we better understood this normative course, we would be in an improved position to understand disruption. We are convinced that Bowlby’s attempt to integrate the study of individual differences with that of normative development is as important today as it was six decades ago. The last 20 years have seen contributions to the attachment literature that emphasize descriptions of individual differences across special populations; in particular, there is a trend toward considerations of what might be considered comorbidity or the linkages between processes and outcomes for unique samples (i.e., populations of individuals identified as on the autism spectrum or struggling with attention disorders, or studies that consider connections between attachment quality in early childhood and later conduct disorders and other social or mental health pathologies). Perhaps the largest overarching need this field must address in future work is the current dearth of scholarship on the lifespan nature of normative attachment, across a diversity of populations and sociocultural contexts.

This volume is filled with chapters addressing a variety of populations, relationships, and developmental periods. A full understanding of each of these separate issues will not be possible without considering the organization of the individual’s attachment behavioral system in the period under study. In fact, the most powerful design would be to integrate normative and differential approaches through the use of developmental pathway models first discussed by Bowlby (1969/1982; based on Waddington, 1957) and supplemented by our growing understanding of the different kinds of relationships that emerge across development.

**Changes in Attachment Behavior beyond the Preschool Years**

Bowlby (1969/1982) suggested that the goal-corrected partnership is probably the last phase in the ontogeny of attachment. By this he seems to have meant that there are no further “stage” changes in this behavioral system. The attachment behavioral system, however, remains important throughout the lifespan and does continue to undergo significant changes. These probably include further elaborations at the same “level,” as well as changes in the relations between the attachment and other behavioral systems, the higher-order control structures, activating and terminating conditions, and IWMs. Certainly, there are also many instances in which children form new attachments. One clear implication is

**that attachment becomes increasingly difficult to measure as it becomes more sophisticated, more abstract, and less dependent on proximity and contact, as the behavioral systems becomes elaborated into more and more complex systems (Bowlby, 1969/1982). For a detailed account of the course of these developmental changes, see Marvin and Britner (2008), as well as the relevant developmental chapters in this volume.**
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