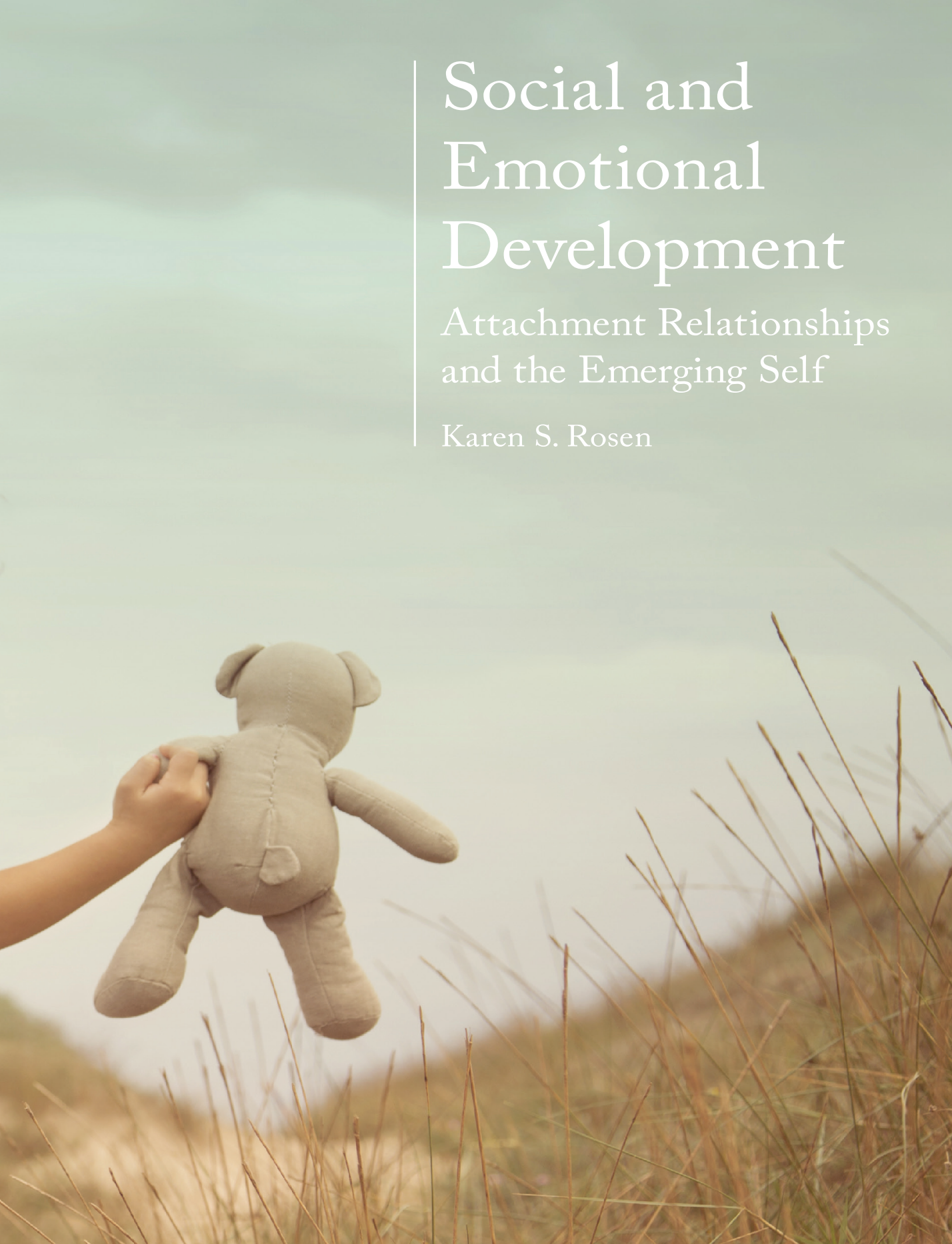
Social and Emotional Development

Attachment Relationships and the Emerging Self

Karen S. Rosen



SOCIAL AND EMOTIONAL DEVELOPMENT: ATTACHMENT RELATIONSHIPS AND THE EMERGING SELF

Social and Emotional Development: Attachment Relationships and the Emerging Self

Karen S. Rosen, PhD

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About the Author

Dr. Karen Rosen is Associate Professor in the Department of Psychology at Boston College, where she teaches courses in developmental and clinical psychology. She also serves as the Director of the Psychology Honors Program and of the Undergraduate Clinical Concentration. In addition, as a Senior Staff Psychologist at Brookline Psychological Services, her clinical practice focuses on a range of psychological issues, including attachment and self-related disorders.

Dr. Rosen received her PhD from Harvard University. Her research on parent–child attachment relationships and sibling relationships has been published in many scholarly journals and in several edited books. She has presented her work at both national and international conferences.

Preface

From the moment we are born we live in relation to other people. We depend upon our caregivers for comfort and welcome their calming presence, gentle touch, and warm embrace. We interact with our caregivers, first with emotional signals and gestures and later with language and emerging social skills. We rely on our caregivers for the safety and support they provide as we gradually move away from them to explore and discover our ever-expanding world. When hesitant, we may be encouraged by their loving assurance. When distressed, we seek contact with them and this may eventually calm and soothe us. Over time, and with repeated interactional experiences, we develop attachment relationships, first to our primary caregivers and then to other significant people in our social world. Ideally, we derive comfort from the security of our attachment relationships. They are essential to our social and emotional development. As our social world grows, we play and learn with our siblings and peers, helping and companioning each other, sharing new discoveries with curiosity and interest. We feel pleasure and joy, frustration and sadness, hurt and anger. Together, we build the foundation for new relational experiences that are woven into the deeper friendships that we ultimately come to form. We reciprocate confidences, cooperate, compete, and struggle, as we learn to negotiate and compromise. Through all of these interactions, our connections to others are transformed.

In this process of learning about our earliest attachment relationships, we also come to understand that we are individuals – autonomous, unique, and distinct from others. The self emerges in the first few months and years of life, influenced by, and developing parallel to, our emotionally significant attachment relationships. In infancy, we form a nascent sense of our separateness from our caregivers and come to physically recognize ourselves. We then begin, in childhood, to distinguish who we are, what we like, what we are good at, and how we compare to our siblings and peers. As we continue to build on our evolving understanding of our self over time, we learn to regulate our emotions and behaviors and to feel increasingly competent. It is this emerging sense of self that we then bring to our relationships and that allows us to negotiate new ways of interacting in our social world. Balancing our sense of self with a continued feeling of connection to others is our developmental challenge throughout the lifespan. Just as our attachments provide the starting point from which the self is born, so too does the self allow for evolving connections to others that are deeper and more meaningful. From the

beginning, the interrelated themes of attachment and self form the foundation of our social and emotional worlds.

The themes of attachment and the self provide the organizing framework for this textbook. Issues relevant to these themes are examined in alternating chapters that consider developing attachments and aspects of the self from birth through adolescence and into emerging adulthood. We begin by exploring attachment relationships in infancy and then infant individuality and the origins of the self. Here, we consider the role of temperament, emotional development, and the initial emergence of the autonomous self. Then, relationships with siblings, peers, and friends are examined, as children's social worlds extend outside of the family and new connections are nurtured. The evolving sense of self is considered once again as it influences, and is influenced by, advances in children's cognitive, social, and emotional competencies. Thus, characteristics that contribute to, and reflect, children's unique sense of self are explored, including the development of empathy and perspective taking, the inclination to engage in prosocial behavior, the ability to regulate emotions, and the capacity for moral thought and decision making. Finally, adolescent social relations and the consolidation of the self in adolescence are examined. Theory and research findings are clearly presented. Controversial issues are addressed and questions that remain unanswered are highlighted. The reader is provided with a comprehensive understanding of the antecedents to, and developmental consequences of, attachment relationships and the emerging self from infancy through adolescence.

There are several additional aspects of the integrative approach adopted in this text that are noteworthy:

1. The focus is on understanding normative trends as well as individual differences. Questions about "what" develops "when" are examined. More important, however, is the exploration of "how" and "why" development occurs as the current research that is reviewed in the book examines underlying mechanisms and the multiple factors that influence developmental outcomes.
2. While developing attachment relationships and an evolving understanding of the self are considered as major developmental tasks in the social and emotional domains, emerging cognitive competencies underlie, and are in turn influenced by, social and emotional advances. Moreover, biological factors, such as temperament and evolving brain structures, influence developmental pathways. Thus, important advances from contemporary research in social-cognitive development and developmental social neuroscience are incorporated.
3. Children's experiences are deeply impacted by their families and the larger social and cultural context in which they live. Where it is relevant, and research findings are available, attention is drawn to cultural issues and the distinct values and beliefs that contribute in important ways to our understanding of developing social and emotional competencies in children around the world.

4. Understanding the pathways to both normal and atypical patterns of development raises questions about the risk and protective factors that contribute to vulnerability and resilience in children and adolescents. There are many difficulties that may arise in the course of development. Disruptions or disturbances in early attachment relationships, and threats to the emergence of the self, may contribute to individual fragility, lead to maladaptive patterns of behavior, and make the resolution of subsequent developmental challenges more problematic. Theoretical background and empirical findings will be presented that contribute to our understanding of individual and relational factors leading to adaptation or the development of psychopathology. Therefore, this book is relevant to the work of advanced students and developmental researchers, as well as to clinicians and those who are dedicated to improving the lives of children and families.

Acknowledgments

The intricate connection between attachment relationships and the emerging self has served as an organizing theme in my professional work, providing a coherence to my thinking as a professor, researcher, and clinical psychologist. Throughout my career, I have been fascinated by the study of early attachment relationships, their precursors and developmental consequences, and the role that they play in self-related thinking, feelings, and behaviors. The self, in turn, influences developing attachment relationships, not only during infancy but throughout the lifespan. Thus, these related themes are central to the questions I continue to ask in my ongoing research, to the framework I have adopted in my teaching, and to the way that I have come to understand many of the struggles and challenges of my patients in the clinical consulting room. It, therefore, seemed very appropriate to be structuring this book around the related themes of attachment and the self.

There are many people who have generously supported me while writing this book. I want to thank my colleagues in the Department of Psychology at Boston College for encouraging the kind of careful analysis and critical thinking that is essential to our role as teachers and scholars. I am especially fortunate to work with a group of wise and dedicated clinicians at Brookline Psychological Services: Cheryl Abel, Dr. Virginia Byron, Dr. Diane Kwasnick, and Mikele Rauch. We have offered each other, in our weekly consultation meetings, a safe haven for professional exploration and growth. Together, we have come to appreciate the relational, personal, and experiential challenges that may undermine secure attachments but, when understood, may ultimately lead to individual growth and new ways of maintaining connections. Many of our discoveries are reflected in this book.

In my work as a clinical psychologist, my patients have trusted me to listen, to make sense of their feelings, to respect the silences, and to help them sort through the repetitive relational patterns, betrayals, and emotional injuries that reflect their earlier attachments. I am humbled and impressed by their courage, respectful of their honesty and resilience, and grateful for all that I continue to learn from them. In our work together, we integrate and come to understand their personal and relational histories. Over time, they use this more cohesive narrative, and the insights that emerge from our clinical work, to promote healing. The security of our relationship serves as a transformative context for creating new opportunities for growth and change.

The many students I have taught over 30 years at Boston College have inspired and challenged me. This book was born out of successive semesters

teaching both an undergraduate course and a graduate seminar on social and emotional development. The organization and structure of this book reflects a consolidation of the way I have conceptualized and taught these courses. My hope is that this book will serve as the foundation for others to learn about the related themes of attachment and the self. Supplementing this text with the many new research findings that continue to emerge on both of these topics will help readers appreciate the advances and controversies that stimulate new empirical studies and the development of appropriate clinical interventions.

I would like to acknowledge the editors at Palgrave, especially Paul Stevens and Isabel Berwick, whose support and patience, and confidence in the importance of this work, were instrumental in providing the context for me to write. You have skillfully guided this project and brought my thinking to a larger audience. It has been a pleasure working with you.

Finally, I would like to warmly thank my most special attachments. To my friends: Dr. Diane Kwasnick, your compassion, clarity, and insights, and our friendship, have been essential to me both personally and professionally. I am comforted knowing you are by my side. Robert Abel and Madelaine Abel, I have always appreciated your steady encouragement, unwavering support, and enduring friendship. To my children: Emily, Gabriel, and Rebecca Rosen, I cherish the connection that I have with each of you. I am always here to support and hold you securely, whether in close proximity or across a distance. I lovingly celebrate your unique and wonderful emerging selves. And to my husband: Dr. Ron Rosen, I am deeply grateful for your love and sustaining presence, your confidence in me, and your dedication to our relationship. You have helped me to stay emotionally grounded over the many years we have been together. You will always be my secure base.

Attachment Relationships During Infancy

1

How do infants develop emotionally significant attachments to their caregivers? And why are these relationships so important? The attachment process gradually unfolds in a manner that is biologically based but depends on parental, familial, and cultural influences. While all babies develop attachment relationships with their primary caregivers, the quality of these attachments will reflect contributions of each interactional partner and the history of their interactions over time. Ultimately, variations in the security of early attachment relationships have profound implications for later social and emotional development.

In this chapter, attachment theory and research will be explored. Beginning with the work of John Bowlby, the theoretical foundation will be provided for current thinking about attachment relationships. Research will be presented that has looked at the ways in which infants and caregivers are prepared to develop attachment relationships and the neurobiological basis of parent–child interactions. Methods for evaluating qualitative differences in attachment relationships will be critically discussed. Studies exploring the precursors to, and developmental consequences of, variations in attachment security will be reviewed. Integrated throughout will be empirical findings and provocative issues that have resulted in the reworking of earlier theory and/or the identification of some new lines of research. Questions about attachment relationships beyond the infancy period, and the development of multiple attachment relationships, will be examined. There will be a particular focus on studies that illuminate the processes involved in promoting continuity or discontinuity in attachment patterns over time. Contemporary trends in empirical work will be highlighted as well, including the effects of early child care and the neuroscience of attachment relationships. Finally, the clinical implications of attachment theory and research will be discussed.

A good place to begin our exploration is to consider two young girls, Katie and Anna, who have been friends for years. They both attended the same child care center from the age of about 2 months. At first, Katie was more calm and relaxed, whether alone in her bouncy seat or carried in the

arms of a child care provider. Anna spent her awake time actively looking around the room, watching what others were doing, and preferring contact with adult caregivers. When Katie began to crawl, and then to walk, she was happy to explore the room, to involve herself in an independent activity, to spend time engaged in play with puzzles or toys, or to gradually approach other children to see what they were doing. When distressed or in need of help, Katie was effective in seeking out the child care providers for comfort or direction. By contrast, as Anna approached her first birthday, she had difficulty engaging in independent play. She was much happier when sitting near an adult and rarely moved off on her own to explore the toys or engage in activities, either alone or with other children. But she "liked" Katie and Katie "liked" her – they were interested in each other, moved towards one another as they became mobile, babbled, imitated sounds, and then eventually talked, enjoying their "conversations," laughing, and fully engaged. As they got older, they actively greeted each other every morning, seemed happiest when playing together, and had more difficulty at child care when one of them was not in attendance because of illness or changes in parental schedules. They had come to rely on one another for comfort and security, companionship and play.

Katie's mother came to get her from the child care center at the end of each day. When she was younger, her mother's entrance into the infant room brought a huge smile to Katie's face. She would wiggle and squeal and bounce in her infant seat. And as her mother approached her and picked her up out of her seat, Katie beamed while she snuggled into her mother's embrace. As she got older, if she was involved in an activity with Anna or some of the other children, Katie would wait for her mother to come to her side so she could show her, with great excitement, what she had been doing. She would chatter endlessly about the picture she was drawing, the structure she was building, or the game she had been playing with Anna and her other playmates. Sometimes Katie would run to her mother's side and drag her over to where she had been playing, insisting that her mom see what she had been doing in her absence. Then, when satisfied, Katie would collect her belongings and happily leave with her mom, but not before saying "goodbye" to Anna.

Anna's mom usually picked her up from child care after Katie had left to go home. Sometimes her father would pick her up if he was done with work before her mother. As an infant, Anna would generally be in one of the caregiver's arms, passive and seemingly content to be held. As she got older, she would often sit quietly with a child care provider after Katie left, not needing to be involved in activity so much as to avoid being by herself. Sometimes she would color alone or look at a book. When either of her parents appeared at the child care center, Anna was aware they had come in but barely acknowledged their entrance, quickly put her things away, and left without much emotion or conversation. Though happily engaged with Katie when playing together, Anna had difficulty involving herself in play with the other children in her classroom. Her affect was more muted and her play more restricted.

She watched, with great interest, what the other children were doing but had difficulty joining with them or getting involved in their play activities.

How can we come to understand the developmental precursors to Katie and Anna's ways of relating to each other, to their child care providers, and to the other children in their child care classrooms? How can we account for the observed differences in their personalities and behaviors? It is no longer relevant to ask whether infants are "blank slates" who are impacted by the entirety of their social experience or genetically programmed to develop with no influence from their parents. Rather, we now know that children develop in an interactive context and that "context" needs to be conceptualized broadly, on multiple levels, and over time. Some have argued that babies grow within the minds and behaviors of those around them (e.g., Winnicott, 1965/1996) so that the context is the psychological state of the mother. Others focus on relationship systems (Sroufe & Fleeson, 1986) or networks of relationships at successive levels of complexity (Hinde, 1987), or adopt a systems perspective for understanding dynamic processes that change over time (Minuchin, 1988; Sameroff & Chandler, 1975). Still others (Bronfenbrenner, 2004) consider individuals from a bio-ecological framework, taking into account the child's biological inheritance nested within the larger microsystems of family, school, and neighborhood, as well as the societal macrosystems. Thus, although Katie and Anna were each born with their own unique genetic endowments and temperamental predispositions, their experiences with their primary caregivers, in their own unique family and social contexts, undoubtedly impacted the emergence of particular patterns of interaction.

Given this complexity of contexts, and the nonlinear trajectories along which children develop, it is impossible to offer a single, clear pathway that accounts for the multitude of influences on young children's social and emotional development. Still, we can consider some of the key elements in children's lives that set them on their developmental course. We will begin by exploring, in this chapter, the experiences that children, like Katie and Anna, have in their first year of life that contribute to the development of their early attachments. The construct of attachment provides a way of characterizing the quality of the emotional relationship that infants form with their primary caregivers. In subsequent chapters, the attachment construct will also be used as the basis for considering the development of concepts about the self during infancy, childhood, adolescence, and emerging adulthood.

The Early Roots of Attachment Theory

Attachment theory originated from the very painful and poignant clinical observations, conducted in the 1940s and 1950s, of young children for whom relationships with their mothers were disrupted (e.g., Bowlby, 1944; Robertson & Bowlby, 1952). Through understanding what happened when things went "wrong," the mechanisms underlying the normal process of developing

attachment relationships were uncovered. John Bowlby was a psychoanalyst who, early in his career, made the first observations that raised questions about the disruption of the maternal bond. Bowlby was especially intrigued by what he observed in young children with whom he worked at the London Child Guidance Clinic. He eventually came to report retrospectively on these children who had so profoundly impacted him and his thinking in a seminal paper, "Forty-Four Juvenile Thieves: Their Characters and Home Life" (Bowlby, 1944). Based on the attention that was increasingly being given to children's relationships with their mothers, Bowlby's clinical assessments of these children focused, in particular, on "the elucidation of the mother–child relationship in each and every case" (Bowlby, 1944, p. 20). Clinical interviews, and careful consideration of the delicate emotional material provided, led Bowlby to some important conclusions.

> [I]n several cases sympathetic discussions with the mothers of the children revealed that their apparent love for their child was only one aspect of their feelings about him. Often an intense, though perhaps unadmitted, dislike and rejection of him also came to light. Furthermore, very careful enquiries showed a remarkable proportion of children who, for one reason or another, had not lived securely in one home all their lives but had spent long periods away from home (Bowlby, 1944, p. 20).

Bowlby came to believe that when the child's relationship with the mother was interrupted by prolonged separation in the early years, this could provide an important clue to explaining the development of psychopathology later on.

A decade later, Bowlby, together with his colleague, John Robertson, observed that separation from the mother for extended periods, even if children are nurtured and nourished by others, can lead to a predictable response of angry protest followed by deep despair (Robertson & Bowlby, 1952). Mothers seemed to be extremely significant to young children and Bowlby continued to ask why this was the case. Others were documenting similar observations (e.g., Bender & Yarnell, 1941) that, taken together, led Bowlby to argue that the mother–child relationship is critical, both to children's current functioning and to their later development (Bowlby, 1969/1982). The idea that social relationships influence, and are impacted by, development and psychopathology was not new, as ego psychologists (Freud, 1965) and object relations theorists (Mahler, Pine, & Bergman, 1975; Winnicott, 1965/1996) emphasized the importance of early relationships for social and emotional functioning. However, Bowlby highlighted both the emotional significance of the early maternal attachment relationship and the implications of disruptions to this relationship resulting from prolonged maternal separation and loss.

Bowlby's ideas about *why* the early emotional comfort and security provided by the mother were essential to the child were novel, especially since secondary drive theories offered the prevailing explanation for why the child

formed a close tie to the mother. Psychoanalytic and social learning theorists suggested that the infant's relationship with the mother develops because she feeds the infant; the mother's presence comes to be associated with the pleasure of satisfying hunger drives and so being near to the mother must be comforting as well (Freud, 1910/1957; Sears, Maccoby, & Levin, 1957). Bowlby became increasingly uncomfortable with these associative learning secondary drive theories, though at the time there were no alternatives (Bowlby, 1980). Moreover, ethological studies offered contradictory evidence. For example, Konrad Lorenz (1935/1957) observed that infant geese became attached to the first moving object in their view, whether or not it was the parent and even when it did not feed them. And in his classic studies, Harry Harlow (1958) demonstrated that infant rhesus monkeys that were stressed preferred the cloth-covered surrogate "mother" who provided security and comfort to the wire-mesh "mother" who provided food.

Over subsequent years, Bowlby went on to formulate attachment theory, drawing heavily on ideas from conversations with colleagues in the fields of ethology, evolutionary biology, cognitive science, developmental psychology, and control systems theory (Bowlby, 1969/1982). He argued that through the process of natural selection, a biologically based desire for close proximity to the mother emerged. Bowlby articulated his ideas more fully in his now seminal trilogy, *Attachment and Loss* (Vol. 1: Attachment (1969/1982), Vol. 2: Separation (1973), Vol. 3: Loss (1980)), though the "basic blueprint of attachment theory" (Bretherton, 1992, p. 762) was provided in his earlier paper, "The Nature of the Child's Tie to His Mother" (Bowlby, 1958). In his writings, Bowlby offered an evolutionary perspective on attachment behaviors (Bowlby, 1969/1982). He proposed that the infants of humans, as a species, have survived within an "environment of evolutionary adaptedness," where the behavioral propensities of babies and parents allow them to maintain proximity to one another. This physical closeness is essential because it allows the infant to be protected, thereby maximizing the possibility for survival. Thus, Bowlby referred to the "biological function" of attachment behaviors as protection from predators. This concept was then expanded when Bowlby incorporated the idea that infants are predisposed to seek out parents when distressed. While in proximity, infants are nourished, comforted and calmed, engage in social interaction, and learn about their environment. Consequently, maintaining proximity to attachment figures is essential for survival, support, and comfort and is a normal sign of emotional health. Indeed, Bowlby so wisely suggests: "All of us, from cradle to grave, are happiest when life is organized as a series of excursions, long or short, from the secure base provided by our attachment figures" (Bowlby, 1988, p. 62).

Bowlby's attachment theory focuses on the biological bases of attachment behaviors. These behaviors have the "set goal" of increasing the child's proximity to the attachment figure (who is usually the mother). Because human infants, unlike babies of other species, cannot move closer to or follow after adults for many months after birth, they rely on attachment behaviors or

signals that encourage adults to come close to them. When babies smile or vocalize, these signals often bring the mother closer to the child, informing her that her baby is interested in interaction. When infants cry, this prepotent signal is also very effective in bringing the mother towards the baby, to pick up, comfort, and ultimately soothe the distressed infant. With time, increased physical and motor development lead to infant searching, approaching, and following, as well as physical attempts to initiate or maintain contact (e.g., reaching, holding on), which are more active behaviors that move the infant to the mother or keep him in proximity to her.

The effectiveness of these signals, of course, depends on the adult's predisposition to respond when the infant cries, smiles, vocalizes, or approaches. Crying, in particular, is an important attachment signal that alerts parents to their infant's distress (Soltis, 2004). Crying usually elicits empathic feelings in parents and motivates proximity and care with the goal of reducing distress. Crying also serves an evolutionary function in enhancing infant survival by stimulating parental responsiveness (Bowlby, 1969/1982). There are, however, important differences in sensitivity to infant crying. Indeed, maternal sensitivity to infant crying, as compared to sensitivity to other signals in nondistress situations, has been found to have greater explanatory power in predicting qualitative differences in infant attachment security (McElwain & Booth-LaForce, 2006). This suggests that crying plays a crucial role in the development of the mother–child attachment relationship. When parents have an aversive reaction to infant crying, they are more likely to respond insensitively (Dix, Gershoff, Meunier, & Miller, 2004; Riem, Bakermans-Kranenburg, van IJzendoorn, Out, & Rombouts, 2012), thereby undermining the development of a secure attachment.

Thus, Bowlby's conception of attachment is essentially a relational one; attachments develop out of interactions with significant caregivers. Over time, children and parents exert an influence on one another and establish a coordinated patterning of attachment-related behaviors. Their relationships are dynamic. Ultimately, the organization of the relational system is as important as is the contribution of each of the individuals within the relationship.

The Attachment Behavioral System

The concept of a behavioral system, which Bowlby borrowed from ethology (Bowlby, 1969/1982), refers to a species-specific set of behaviors that lead to certain expected and predictable consequences. The "attachment behavioral system" consists of behaviors that serve the goal of maintaining proximity, which in turn ensures survival. Bowlby argued that there is an inherent motivation to engage in these behaviors since they contribute to reproductive fitness. Whether or not parents are meeting the child's physiological needs, children engage in attachment behaviors and develop an attachment relationship. This relationship is not a consequence of basic processes or drives; rather

the attachment behavioral system is activated on its own because it involves its own inherent motivation. Over time, in response to a history of interaction with the caregiver, attachment behaviors achieve an organization that is particular and unique to the dyad.

In their seminal paper, Sroufe and Waters (1977) elaborate on this idea and describe attachment as an *organizational construct*, arguing that

> attachment is not viewed as a static trait; rather, it has the status of an intervening variable or an organizational construct, to be evaluated in terms of its integrative power. It is not a set of behaviors that are constantly and uniformly operative (in the manner of a temperamental characteristic) or even operative with a fixed probability of occurrence. Neither is it reducible to the interaction between infant and caregiver, though it is a product of that interaction (as it is shaped by species general characteristics, cognitive development, and characteristics of the individual baby and caregiver). Rather, attachment refers to an affective tie between infant and caregiver and to a behavioral system, flexibly operating in terms of set goals, mediated by feeling, and in interaction with other behavioral systems. In this view, behavior is predictably influenced by context rather than constant across situations. (Sroufe & Waters, 1977, p. 1185)

When conceptualized in this way, different attachment behaviors may serve the same function. A child who is unable to move may reach out to and cry for the mother in order to achieve contact, while a crawling infant may achieve the same goal by moving to her side. Additionally, while discrete behaviors that serve the attachment system may vary, there will be stability across context and over time in the organization of attachment relationships, based on the history of the dyad's interactions. Both developmental and contextual changes will influence the precise behaviors used to achieve the set goal of proximity to mother (Cassidy, 2008).

Bowlby (1969/1982) argued that the attachment system is activated when the child is stressed or in danger. When, for example, the child is hungry or tired, or when the mother has left the room and the infant notices she is "missing," or when there is a loud and unexpected noise, attachment behaviors may be activated. The goal for the child is to reduce environmental or personal stress; that, in turn, reduces the activation of attachment behavior. So when the mother talks to, picks up, feeds, or rocks her baby, this "return" of the mother and associated contact with her is usually an effective intervention to reduce the infant's distress. Sometimes, the solution may simply be hearing her soothing voice; at other times, physical contact and touch may be essential. The extent to which the attachment system is activated will determine how much is required from the attachment figure to reduce the infant's distress. Thus, the goal is to return to a state where the infant is calmed and a feeling of security is achieved.

Sroufe and Waters (1977) also broadened Bowlby's account of the function of attachment behavior. They argued that, in many species, protection from danger was of primary importance. For human infants, however, the attachment figure serves as a secure base for exploration (Ainsworth, 1963, 1972). Moreover, Sroufe and Waters (1977) suggest that exploration is of paramount importance for human infants who rely on their caregivers to expose them to the social and object worlds, as they learn to flexibly approach new situations and problems and develop problem-solving skills. Attachment and exploration are, thus, two behavioral systems that operate in dynamic relation to one another (Ainsworth, 1972). When the infant is secure in her understanding of the caregiver's availability, the possibility for exploration is maximized (Sorce & Emde, 1981). When the attachment system is activated (e.g., upon separation from the attachment figure), or if the environment is threatening (e.g., too many novel stimuli, noises, or people), then exploration and playful exchanges are reduced in frequency. Thus, the two systems balance one another: attachment fosters exploration and exploration is enhanced in the presence of attachment figures.

Finally, Sroufe and Waters (1977) highlight the affective connection inherent in attachment relationships. They view attachments as the "psychological tether which binds infant and caregiver together" (Sroufe & Waters, 1977, p. 1186). Though dependent on cognitive abilities, such as object permanence and discrimination learning, the affective bond is evident in "the expressions of positive affect embodied in the bouncing, smiling greeting reactions to caregivers and the apparent security and comfort derived from the mere presence and later the internal representation of the caregiver" (Sroufe & Waters, 1977, p. 1186). When described in this way, attachment relationships are organized to reflect this affective bond (see also Sroufe, 1996). And while it cannot be observed directly, the affective bond is what allows the infant to use the attachment figure as a secure base, to explore in her presence, to be distressed by separation, to express pleasure on reunion, and to seek proximity when uncomfortable. It is also what accounts for the sequence of behaviors – protest, despair, detachment – observed to follow prolonged separation from attachment figures (Bowlby, 1969/1982; Robertson & Robertson, 1971). Attachment is thus a special emotional *relationship* between infant and caregiver, one that evolves over time, reflects the dyad's interactional history, and represents a mutual affective tie.

How Are Infants Prepared to Develop Attachment Relationships?

Many of their earliest perceptual abilities prepare infants to relate to faces and people and to be social beings. Infants generally seem to prefer to look at faces than to look at inanimate objects. In one early demonstration of this preference (Tronick & Brazelton, 1980), infants were filmed as a toy monkey,

suspended on a wire, was brought almost within the infant's reach and then taken away from the baby. The infants responded with great excitement, attempting to grasp and explore the toy with irregular, uneven movements. When filmed while responding to their mothers, babies looked at, smiled, and responded to the mother in a more fluid and integrated manner, sometimes looking away before looking back at her. Infants also show a preference for high contrast colors and facial features. Black and white drawings of faces capture their attention even in the first few minutes of life. Newborns and their mothers often seek out each other's eyes following birth. And babies distinguish lines resembling the eyes, nose, and mouth; that is, they are attuned to face-like shapes (Music, 2011). Babies also show a preference for looking at pictures where the faces have eyes that are open rather than closed (Field, Cohen, Garcia, & Greenberg, 1984). Taken together, these research findings suggest that newborns are biologically prepared to recognize faces that, in turn, can elicit positive responses and promote interactive exchanges.

Studies of babies' responses to the mother's voice also demonstrate that there are clear preferences present from birth. Measures of the differences in fetal heart rate changes that occur when hearing tapes of a stranger's voice, as compared to the mother's voice, demonstrate that babies learn the sound of the mother's voice very early (Kisilevsky et al., 2009). When babies listen to their mother's voice, their brain waves are different from when they listen to the voice of another female. Babies are also much more interested in their mother's voices, can change their sucking rates to restore a recording of their mother's voices reading to them, and reveal, through sucking rate patterns, an ability to discriminate between stories, showing a preference for the one that was read to them *in utero* by the mother (DeCasper & Spence, 1986). However, newborns' capacity to discriminate faces and speech are compromised in babies of depressed mothers (Field et al., 1984). There is a disruption to the normal rhythm in face-to-face exchanges when children are interacting with a nonresponsive mother simulating the experience of depression (Tronick, 1989), suggesting that certain experiences may result in a "switching off" of these innate abilities. Thus, the infant's repertoire of potential social skills can only develop within a context of interaction with others who are responsive to their gestures, signals, and cues.

One skill that facilitates interaction is imitation. Infants have been found to be able to imitate their parents when parents stick out their tongues. As soon as 20 minutes after birth, babies watch carefully and, with some effort, proceed to stick out their own tongue (Meltzoff, 2007). They also can imitate, as soon as two days after birth, expressions such as smiling and frowning (Field, 2007), a remarkable demonstration of early attempts to communicate. They show increases in heart rates when they imitate gestures; when adults imitate their gestures, infants' heart rates slow (Trevarthen & Aitken, 2001). Babies also come to imitate sounds and gestures in a synchronized pattern as they listen to adults "baby talk". In sum, infants experience an emotional and physiological regulation that comes from interactions with parents who are attuned to them.

How Are Parents Prepared to Develop Attachments to Their Children?

While the hormones involved in pregnancy prepare mothers to become parents, there are also hormonal changes that occur in fathers anticipating their child's birth (Storey, Walsh, Quinton, & Wynne-Edwards, 2000). Even before a baby's entrance into the world, hormonal shifts prepare parents to engage in the type of behavior that is essential for developing attachments. Mothers become more sensitive to infant cries (Corter & Fleming, 2002). Mothers and fathers experience a range of neuroendocrine changes that provide the foundation for developing attachments (Feldman, Gordon, Schneiderman, Weisman, & Zagoory-Sharon, 2010; Samuel et al., 2015). In the postpartum period, prolactin levels rise when parents are involved in child care. During pleasurable interactions with their young babies, both mothers and fathers release oxytocin (Feldman, Gordon, & Zagoory-Sharon, 2010). Indeed, higher levels of prenatal oxytocin have been associated with more optimal maternal interactive behaviors in the postpartum period (Feldman, Gordon, & Zagoory-Sharon, 2011).

The core processes involved in effective parenting are dependent upon the functioning of particular brain regions or circuits (Hughes & Baylin, 2012). For example, when oxytocin is released from the medial preoptic area in the parent's brain, it activates dopamine neurons that then extend into the brain's reward system (the nucleus accumbens), resulting in the activation of parenting behavior (Numan & Stolzenberg, 2008). Recent research also suggests that, for fathers, vasopressin and prolactin combine with oxytocin, leading to similar brain changes that prepare them to parent. While mothers and fathers engage in distinct styles of interaction with their babies, the same brain reward system is involved, motivating mothers and fathers to engage in caregiving and to find it rewarding (Gordon, Zagoory-Sharon, Leckman, & Feldman, 2010). For some fathers, testosterone levels decrease when they begin to interact with their infant after birth. Men who have lower testosterone levels spend more time holding a baby doll and respond more to infant cries and other cues as compared to men who do not experience a decrease in testosterone (Fleming, Corter, Stallings, & Steiner, 2002). In fact, even before their babies are born, men who are more intimately involved with their wives during the pregnancy exhibit greater hormonal shifts. And more experienced fathers who already have a child have testosterone levels that are even lower than childless men (Gray, Yang, & Pope, 2006) and first-time fathers (Corter & Fleming, 2002).

Infant survival and development are dependent upon the provision of certain parental behaviors that organize the infant's physiological reactions and promote well-being and adaptation (Bowlby, 1969/1982; Leckman & Herman, 2002; Tronick, 1989). Mothers and fathers form internal cognitive representations of their baby even during pregnancy, suggesting that parents' relationships with their infant evolve before the child's birth, thereby facilitating the transition to parenthood and influencing caregiving behaviors and the

developing attachment relationship (Benoit, Parker, & Zeanah, 1997; Theran, Levendosky, Bogat, & Huth-Bocks, 2005; Vreeswijk, Maas, Rijk, Braeken, & van Bakel, 2014). Thus, adults bring to their role as parents certain biological, behavioral, and psychological processes that promote their infant's growth (Carter et al., 2005).

Indeed, certain parental behaviors are evident immediately after birth and have been found to organize, in important ways, the infant's physiological and behavioral responses. Behaviors such as maternal gaze at the infant face, expression of positive affect, high-pitched vocalizations, and affectionate touching are critical to the developing relationship (Bowlby, 1969/1982). These parental behaviors help infants to organize and regulate their own emotions and behaviors within the developing attachment relationship. Initially, infants rely on the caregiver to help modulate their cries or their angry protests. They learn to initiate interactions with smiling or eye contact and to terminate interactions with gaze aversion or by falling asleep. Responding sensitively and appropriately to their infant's cries is a way that caregivers communicate their availability to their babies and help their infants decrease their arousal. Thus, caregivers' responsiveness contributes to the quality of the attachment relationship while helping the infant to regulate affect (Cassidy, 1994; Thompson & Meyer, 2007).

The Neurobiological Basis of Parent–Child Interactions

Parents need to adapt their behaviors to moments of infant responsiveness in order to maintain synchronous coordination between themselves and their babies (Feldman, 2007; Isabella & Belsky, 1991). In rodents, research has demonstrated that naturally occurring variations in maternal behavior lead to distinct processes that uniquely influence gene expression, organize the oxytocinergic system underlying formation of bonds in mammals, and impact lifetime ability to manage stress (Champagne, 2008; Weaver et al., 2004). Similarly, in humans, studies have demonstrated that the degree of interactional synchrony between parental behavior and infant responsiveness is associated with peripheral measures of oxytocin in the infant and the parent (Atzil, Hendler, Zagoory-Sharon, Weintraub, & Feldman, 2012; Feldman, Gordon, & Zagoory-Sharon, 2010). When mothers are anxious and disregard their infant's signals and cues, they may overstimulate their babies and engage in intrusive behavior. Interestingly, these synchronous or intrusive maternal styles appear to be relatively stable from birth through adolescence. They are also associated with particular patterns of parasympathetic and hypothalamic-pituitary-adrenal (HPA) axis responses in both children and mothers that are distinctively predictive of social and emotional outcomes in children and adolescence (Feldman, 2010; Feldman, Singer, & Zagoory, 2010; Sroufe, 2005).

Moreover, both sub-cortical motivational limbic regions and high-level emotion modulation networks support the neural basis of maternal behavior

(Hughes & Baylin, 2012). The relationship that develops between the mother and infant is based on the activation and balance of motivational mechanisms that signal stress, such as increased vigilance and threat detection, and reward (Leckman et al., 2004). Distinct motivational and threat-related networks support the formation of affiliative bonds and the stress and reward components of maternal attachment. In particular, the nucleus accumbens and amygdala are structures in the limbic system that have been found to play a role in maternal behavior and bond formation in mammals (Aron et al., 2005; Cardinal, Parkinson, Hall, & Everitt, 2002). The amygdala, in particular, has been identified as playing a critical role in affiliative tendencies and maternal attachment (Oxley & Fleming, 2000; Toscano, Bauman, Mason, & Amaral, 2009). Together with the nucleus accumbens, the amygdala works in conjunction with several cortical areas in mammals, including the medial preoptic area, which promotes parenting and integrates infant sensory cues (Insel & Young, 2000; Lee, Clancy, & Fleming, 2000), and the anterior cingulate and dorsomedial prefrontal cortex (Murphy, MacLean, & Hamilton, 1981; Slotnick, 1967). Because some of these cortical areas have been suggested to play a role in empathic abilities and theory of mind skills (Gallagher & Frith, 2003; Völlm et al., 2006), they may also be involved when human parents read and respond to their infant's signals.

Additionally, functional imaging studies (using fMRI) have highlighted the importance of the nucleus accumbens, the amygdala, and other discrete brain areas for parenting in humans (Barrett & Fleming, 2011; Strathearn, Fonagy, Amico, & Montague, 2009). For example, reward dopaminergic circuits, areas involving oxytocin projections (Strathearn et al., 2009), the hippocampus (Swain, Lorberbaum, Kose, & Strathearn, 2007), and the anterior cingulate and insula (Bartels & Zeki, 2004; Noriuchi, Kikuchi, & Senoo, 2008; Swain et al., 2007) have been identified as distinct regions critical to parental behavior. The coordinated functioning of neural networks, affiliation hormones, maternal behavior, and infant social signals has also been explored in human mothers (Atzil, Hendler, & Feldman, 2011). The limbic motivational network appears to be activated in response to infant stimuli; additionally, brain networks associated with attention and emotion modulation are activated and function in a coordinated manner. Unique integrative profiles of these three functional neural networks have been identified for mothers with synchronous, as compared to intrusive, parenting styles (Atzil et al., 2011). And there also appears to be synchrony in brain regions associated with empathy and social understanding that are activated in response to infant cues across mothers and fathers (Feldman, Bamberger, & Kanat-Maymon, 2013).

Interestingly, fathers who are homosexual and serve as primary caregivers, raising their infants without maternal involvement, show high amygdala activation associated with higher levels of oxytocin and greater synchrony in response to their infants. These primary caregiving fathers also show greater activation in the cortical circuits associated with social understanding and

empathy, similar to what is seen in fathers involved as secondary caregivers (where their heterosexual partner is the primary caregiver). Moreover, for both primary and secondary male caregivers, the amount of time spent involved in caregiving is correlated with greater amygdala activation (Abraham et al., 2014). Thus, months of pregnancy may sensitize the amygdala, but fathers' active parenting may activate and sensitize this brain region as well. Similar results may be found in those circumstances where fathers in heterosexual relationships play an active parenting role, either as a stay-at-home dad or as a single father. Future work will contribute to our understanding of the social and emotional brain systems that are crucial to parenting and to the formation of parent–infant attachments.

Stages in the Development of Attachment

According to Bowlby (1969/1982), there are four stages in the development of attachment relationships: Indiscriminate Social Responsiveness (from birth through 1 or 2 months of age); Discriminating Sociability (from 1 or 2 months through 6 or 7 months); Attachment (from 7 to 24 months); and Goal-Corrected Partnership (from 24 to 30 months onward). While the stages have no clear boundaries, Bowlby detailed the internal processes that facilitate movement through the stages, such as the infant's developing capacity to orient, to signal the caregiver by smiling and crying, to communicate by babbling, and to promote proximity by reaching, grasping, and clinging. He also identified the maternal caretaking behaviors and emotional qualities that he considered central to the development of attachment relationships (Bowlby, 1969/1982).

Phase 1: *Indiscriminate Social Responsiveness*. During the first phase of developing attachment relationships, infants use a repertoire of signals that impact the adults around them. For example, when adults hear an infant's cry, physiological mechanisms are activated that motivate them to relieve the baby's distress (Frodi et al., 1978; Murray, 1979). The most common response is for the adult to pick up a crying infant; holding the baby is also the most effective way of quieting the cries (Bell & Ainsworth, 1972). This is a clear example of Bowlby's assumption that infants and adults possess behavioral predispositions that are biologically determined and that maximize the infant's chances of survival.

Crying is an attachment behavior that brings the baby into close proximity with the caregiver. When a baby cries, adults approach the baby because they want to terminate an aversive signal. Smiling, another attachment behavior that becomes part of the infant's behavioral repertoire during the second month of life, also impacts the caregiver. When an infant smiles, the caregiver wants to stay in close proximity and to continue the interaction because both partners find the interaction pleasurable. Thus, we see that crying and smiling are two attachment behaviors that affect the people in infants' early social

environments. What is particularly noteworthy is that during this first phase in the development of attachment relationships, infants do not show preferences for the people who respond to them; they are satisfied with anyone who responds to their cries or smiles. They do not possess the perceptual or cognitive skills that allow them to discriminate among individuals or to recognize their mothers or fathers. It is when they begin to show a preference for those caregivers with whom they have the most consistent interaction that they make the transition into the second phase of *discriminating sociability.*

Phase 2: *Discriminating Sociability.* From the first weeks of life, infants are capable of using visual, auditory, olfactory, and kinesthetic cues to discriminate among people (Lamb, Bornstein, & Teti, 2002). They recognize their mother's face and can identify their mother by smell or voice (Bushnell, Sai, & Mullin, 1989). We do not know when infants develop multimodal ideas of people that allow them to realize these different features belong to the same person. But infants do begin to show a preference for familiar people; that is, for those with whom they share pleasurable encounters, such as cuddling, rocking, playing, and feeding, and who help to reduce their distress.

As babies' arousal levels becomes more regular, they spend less time sleeping and more time awake (Emde & Robinson, 1979). Their behavior becomes more coordinated and they are more likely to spend their awake time engaged in face-to-face interactions with their parents and other caregivers. While at first the adult assumes responsibility for maintaining the interaction, the baby increasingly plays a role in initiating, sustaining, and terminating these exchanges. What began as an adult-led activity eventually becomes a well-attuned dance where it is difficult for the observer to know who is leading and who is following; the coordinated exchange reflects the dyads' unique history of give and take. So the baby might smile, coo, then avert gaze, return to look at her mother's face, smile again, kick her feet in delight, gaze avert, then look again at her mom, move her tongue in and out, smile. And all of these movements and gestures are likely to be responded to with a similar action from the adult. From these repeated exchanges, several important lessons are learned: (1) *effectance:* the infant's behavior affects the other's behavior in a predictable and consistent way; (2) *reciprocity:* taking turns is part of all social interactions where each partner acts and reacts to the other; and (3) *trust:* the infant can rely on the caregiver to respond to her signals and cues (Lamb & Lewis, 2011). Additionally, these ideas are discovered in the context of adults' responses to infants' expressions of distress and pleasure. When caregivers approach their crying infants and attempt to soothe them, or move toward their smiling infants and try to engage them in playful exchanges, babies learn their effect on others and come to see their social world as predictable and coherent. Because certain specific people are more reliably involved in the baby's care, the history of their interaction leads infants and their caregivers to develop reliable sequences of exchanges that have profound consequences. The infant's level of confidence in the caregiver's responsiveness ultimately contributes to the overall quality of their attachment relationship. Similarly,

qualitative differences in the way each caregiver responds to the baby will impact the baby's perceived effectance and level of trust in that particular caregiver.

Phase 3: *Attachment*. The hallmark of the transition into the next phase of a clear and specific affective bond between the infant and caregiver is the emergence of *separation protest*. Now, infants will cry when the caregiver leaves the room. They have achieved an awareness of the person to whom they are attached and respond with distress when that person goes away. Crying is usually the clear sign that the infant does not want or like separation from the attachment figure (Ainsworth, Blehar, Waters, & Wall, 1978). Babies react to the caregiver's departure and continue to be concerned about where the caregiver might be, as evidenced by attempts at looking for the attachment figure made possible by increased locomotor skills. Once babies are able to crawl, they can explore on their own and play a more active role in searching for the caregiver. When reunited, infants are then able to use the caregiver as a secure base for exploration.

Phase 4: *Goal-Corrected Partnership*. Children assume more and more responsibility for initiating and maintaining interactions with their attachment figures as they grow older. Their more sophisticated language skills, behaviors, and social responses help them to tolerate increasing distance when interacting with their attachment figures. Therefore, exchanges may occur through vocal dialogues, shared gaze, emotional expressions, and behavioral displays, either in close proximity or across some physical distance. Parents may comfort children with their words rather than with a physical approach; they may communicate their loving care with a smile across a room instead of a hug. As children become more familiar with daily routines, learn to tolerate separations from their attachment figures, and become immersed in their larger social world of siblings, peers, and unfamiliar adults, they begin to understand that their caregivers may have needs that are different from their own. Separations may be a part of their regular routine just as reunions provide lots of opportunities for reconnecting and sharing stories about their time apart. Thus, rudimentary role-taking skills and the capacity to take another's perspective help young children navigate the goal-corrected partnership of the attachment relationship.

All children progress through these stages of developing attachment relationships and, except for rare instances of extremely inconsistent contact or supreme neglect, develop an attachment relationship to their primary caregiver. However, not all attachment relationships are equal. Variations in child and caregiver characteristics and behaviors lead to differences in their patterns of interactions. Some children will come to learn that their caregivers are sensitive, reliable, and emotionally available, while others will have caregivers who are inconsistently responsive or insensitive to their infants and unable to meet their emotional needs. Some caregivers will ignore or reject their infant's signals and cues, while others will anticipate their baby's every need, thereby making it unnecessary for the infant to initiate interactions.

Some babies will, by their very nature, be extremely difficult to calm when distressed, while others may be so passive that they seemingly require very little attention from their caregivers. Over time, the history of interactive exchanges between infants and their caregivers will determine the overall quality of their attachment relationship.

How Are Attachment Relationships Evaluated and Described?

During the initial stages of Bowlby's development of attachment theory, Mary Salter Ainsworth, a Canadian developmental psychologist, responded to a newspaper advertisement for a position in a research lab. She was hired and began working with John Bowlby's research team. In the course of her work, Ainsworth conducted two groundbreaking naturalistic studies of infants and mothers in their home environments. These observational studies – one in Uganda in the early 1950s and the other in Baltimore, Maryland in the early 1960s – focused on the analyses of discrete parental and child behaviors that contribute to the attachment relationship. Thus, by applying ethological principles of attachment theory to her work, Ainsworth laid the foundation for continued formulations of Bowlby's attachment theory and offered her own significant contribution to the study of attachment relationships.

With time, Ainsworth, together with her colleagues, developed an assessment procedure, the "Strange Situation", for evaluating the quality of attachment relationships (Ainsworth, Blehar, Waters, & Wall, 1978). This procedure is perhaps one of the most widely used assessments of attachment relationships throughout the world. In the Strange Situation, the child is observed in a series of seven three-minute episodes that involve increasingly stressful experiences. A laboratory playroom is arranged with two chairs positioned to the side of the room (one for the mother and one for the "stranger") and a box of toys placed in the center. The parent and child are introduced to the room, the mother is asked to sit in one of the chairs, and the child is placed on the floor next to the toy box. The mother is instructed to sit quietly, only responding to her child's requests if s/he approaches her, gestures, talks, or offers a toy, but otherwise not to initiate contact with her child. In the first episode, the child is free to explore the toys. After three minutes, the stranger comes in to the room and sits in her chair quietly for the first minute, then talks to the mother for a minute, and then gets down on the floor and plays with the child. At the beginning of the next episode, the mother is signaled to leave the room, the stranger returns to her chair, and the child is now separated from the mother for the first time (though in the company of the stranger). The first reunion occurs in the next episode, when the mother enters to the room, pauses at the door (so that the child's reaction to her return may be observed), and then sits in her chair. After three minutes, the mother hears a signal indicating that she should leave the room again. Now, the child remains in the room alone until the stranger returns in the next three-minute episode. Finally, the mother

returns to the playroom for the last episode and the stranger quietly leaves. As she enters the room, the mother is instructed to pause again, then to talk to and finally pick up her child, and then to place her child down near the toy box, returning to her chair for the remainder of this final episode. The entire sequence of episodes is videotaped. Several interactive behaviors are observed and coded from the videotapes of the 21-minute assessment, including proximity and contact seeking, contact maintenance, avoidance, resistance, search, and distance interaction (for a complete description of the Strange Situation procedure and coding guidelines, see Ainsworth, Blehar, Waters, & Wall, 1978).

The assumption behind the use of the Strange Situation is that the attachment behavioral system will be activated as a result of the stress of being in a new room, meeting an unfamiliar adult (the "stranger"), separating from the caregiver (in the company of the "stranger"), and then separating from the caregiver while alone in the room. The two separations, in particular, are thought to create the most stress and to elicit behaviors (e.g., proximity seeking, contact maintenance, search) reflecting the infant's need to reconnect with the caregiver which, in turn, reduces the stress of separation and facilitates a return to exploration. The organization of the infant's behaviors across the seven episodes, and especially during the two separation/reunion sequences, provides the coder with the information needed to classify the quality of the attachment relationship.

The Strange Situation originally allowed for the classification of infant–caregiver dyads into one of three patterns of attachment – secure, insecure anxious-avoidant, and insecure anxious-resistant (Ainsworth et al., 1978). A fourth pattern, insecure disorganized, was added many years later to describe infants who did not fit into one of the existing three categories. Each of these patterns is described below, with associated caregiving behaviors relevant to the patterns of attachment delineated.

Secure attachment (Group B): Infants in this category appear to be confident in their exploration of the room and toys and in their expectation that the caregiver is a stable secure base for exploration. These infants will, in response to their parent's departure from the room, temporarily inhibit exploration and make active attempts to bring the parent back to the room by vocalizing, crying, or searching for her. When the parent re-enters the room, they return to play and re-engage in interaction with the parent. If distressed by separation, they may seek to be held or cuddled but are then comforted by the parent's presence and are able to return to play. A similar set of responses, though perhaps of greater intensity, will occur during the second separation and reunion sequence. About 60–65% of all infants in the United States who are studied in the Strange Situation demonstrate this behavior. This pattern of *secure attachment* is rooted in consistent and reliable care, where the parent is responsive, in a predictable and sensitive manner, to the infant's expression of need. The message communicated to the infant is that s/he is worthy and valued; care is provided because the infant deserves to be loved.

Insecure anxious-avoidant attachment (Group A): Infants in this group are happy to explore without prompting from or interaction with the caregiver. These infants do not seek contact with the parent during exploration nor are they distressed by separation. They do not greet or seek proximity to the parent upon reunion, ignoring the parent's bids for contact and actively avoiding interaction. They are more inclined to approach and interact with an unfamiliar adult (the "stranger"), though increased stress (with increased activation of the attachment system) leads to more avoidance of both the stranger and the parent. These *insecure-avoidant* infants constitute about 15–20% of infants in US samples. A history of chronic and sustained emotional unavailability from, and/or rejection by, the parent underlies this pattern of attachment. The infant comes to view the self as unworthy of attention and care.

Insecure anxious-resistant attachment (Group C): When entering the new room with the parent, infants in this category show little or no exploration. They are not interested in the toys or the "stranger." Separation from the parent leads to distress which is usually more extreme during and after the second separation. These infants are extremely difficult to comfort and, even when calmed, cannot return to exploration or play. They may seek proximity or contact upon reunion, but this is mixed with angry rejection of the caregiver's overtures to calm them down. About 10–15% of babies in American samples show this ambivalent pattern of *insecure-resistant* attachment that results from inconsistent, chaotic care not tailored to the infant's needs. Continued vigilance by the infant is required to ensure that the parent is available, and even when seemingly available, the care provided is unpredictable, insensitive, and unreliable. The infant learns that s/he is ineffective in eliciting care.

Insecure disorganized attachment (Group D): Mary Main and her colleagues introduced a fourth category of attachment to describe infants whose behavior was difficult to classify using the original three attachment patterns and developed classification guidelines for this group of infants described as "disorganized" or "disoriented" (Main & Solomon, 1990). These infants appear to lack a coherent strategy with respect to using the attachment figure; their behavior reflects confusion about approaching their caregivers, manifested by undirected or incomplete movements, stereotypies, or contradictory behavioral patterns (e.g., moving towards the caregiver and then freezing or exhibiting disorientation). The antecedents to this pattern of attachment include parental depression, marital discord, dissociation, and frightening or disturbing parental behaviors (Main & Hesse, 1990; Schuengel, Bakermans-Kranenburg, van IJzendoorn & Blom, 1999). Disorganized attachments are more often seen in children who have been abused or neglected. Across several studies, about 48% of maltreated children are classified as disorganized, though about 15% of infants in middle-class and about 24% in lower socioeconomic status nonclinical samples have been classified as disorganized as well (van IJzendoorn, Schuengel, & Bakermans-Kranenburg, 1999).

The organization of attachment behaviors, considered in relation to the caregiver and across the episodes of the Strange Situation, is critical to observe.

The patterning of attachment behaviors, not the frequency of any discrete behavior, is assessed to determine the quality of the attachment relationship. The underlying assumption is that the increasingly stressful experiences that the infant needs to manage in the Strange Situation activate the attachment behavioral system. The infant's behavior reflects the ability to balance exploration of the new environment with the need for reassurance and comfort from the attachment figure. The infant and caregiver's interactional history is presumed to lead to certain beliefs and expectations regarding the availability of the caregiver, which are also reflected in the organization of the infant's attachment behaviors. Ultimately, the attachment classification assigned to the *relationship* is based on the careful observation and coding of the *infant's behavior* in relation to the caregiver.

What Contributes to the Development of Attachment Relationships?

Caregiving

Ainsworth and her colleagues initially tested, and found strong support for, the hypothesis that maternal behaviors during the first year predict attachment security at 12 months of age (Ainsworth, Bell, & Stayton, 1971; Ainsworth et al., 1978). Their idea was that when a mother is attuned and responds appropriately to her baby's particular expression of needs, and is capable of adapting her responses as she accepts and meets her baby's biological and emotional states, then her baby learns that her needs will be met and this leads to a secure pattern of attachment. On the other hand, a mother who repeatedly misreads or has difficulty understanding or accepting her infant's signals and cues may be inconsistent in her responsiveness and insensitive to her baby and an insecure attachment relationship is more likely to develop. The initial studies of maternal behaviors focused, in particular, on maternal sensitivity, though the maternal characteristics of acceptance, cooperation, and accessibility were also examined. Sensitivity was defined based on the mother's ability to notice, interpret, and respond to her baby's signals promptly and appropriately. Mothers who displayed higher levels of sensitivity were more likely to have infants who were classified as securely attached at 12 months of age. In addition, high maternal sensitivity was also associated with more acceptance, cooperation, and accessibility (Ainsworth et al., 1971). Maternal sensitivity has since been studied extensively.

There is considerable evidence supporting the notion that infants with more sensitive mothers are more likely to develop a secure attachment to them (for meta-analyses, see Atkinson et al., 2000; de Wolff & van IJzendoorn, 1997; Goldsmith & Alansky, 1987). While many researchers developed new observational measures that extend beyond the original definition of sensitivity, they continue to find meaningful associations with attachment security (Mesman &

Emmen, 2013). However, questions about the strength of this association have been raised (see, for example, Rosen & Rothbaum, 1993). Indeed, the results of the meta-analyses reveal only a modest effect size, thereby raising questions about whether the association between maternal sensitivity and attachment security is as strong as was originally believed.

Some investigators have suggested that the original definition of sensitivity, with a focus on the mother's contingent, prompt, and *appropriate* responsiveness to her infant (Ainsworth et al., 1971), has not been considered carefully enough by attachment researchers. Thus, the meta-analytic results may be influenced by variations in the definitions of sensitivity, thereby leading to the conclusion that "sensitivity plays an important but not exclusive role in the emergence of attachment security" (de Wolff & van IJzendoorn, 1997, p. 586). In fact, detailed coding and analyses of maternal sensitivity, consistent with Ainsworth's relational approach to the assessment of maternal behavior, have been found to yield more robust associations with attachment security (Pederson, Bailey, Tarabulsy, Bento, & Moran, 2014). However, alternative conceptions of parental behavior presumed to be related to attachment security have also been explored. There has been research, for example, focusing on aspects of "affect mirroring" (Fonagy, Gergely, Jurist, & Target, 2002), "mutual responsivity" (Kochanska, Aksan, Prisco, & Adams, 2008), and "affect attunement" (Jonsson & Clinton, 2006; Stern, Hofer, Haft, & Dore, 1985). These differences in the way that the construct of maternal sensitivity has been operationalized may be what accounts for variability in the association between sensitivity and attachment.

Some researchers have argued that other factors need to be considered that may promote or interfere with the development of a secure attachment (de Wolff & van IJzendoorn, 1997; Rosen & Rothbaum, 1993; Seifer & Schiller, 1995). The parent, as the more mature interactive partner, is usually assumed to be influencing her child. However, each member of the dyad influences the other and, thus, the developing attachment relationship. Support for this idea comes, for example, from recent research indicating that secure attachment at 19 months of age was predicted by positive affect in the infant at 4 months, together with highly positive maternal affect. However, insecure attachment was predicted by positive maternal affect together with negative or neutral infant affect at 4 months (Pauli-Pott & Meresacker, 2009). Thus, affective reactions in both mother and child influence the quality of their attachment relationship.

More recently, the construct of maternal sensitivity has been re-examined and elaborated, with an emphasis on the parent's understanding of, and capacity to reflect on, the infant's internal emotional world. This capacity for "mentalization" is seen to be critical to the developing attachment relationship. Moreover, mentalization appears to underlie the intricate connections between attachment processes and the child's growing ability to understand and interpret interpersonal behavior in terms of mental states (Fonagy et al., 2002; Fonagy, Steele, Steele, Higgitt, & Target, 1994).

Some researchers have also made an important distinction between sensitivity to children's emotional and physical needs and sensitivity to mental processes (Meins, 1997). The concept of "mind-mindedness" was introduced to describe the mother's tendency to "treat her infant as an individual with a mind rather than merely as a creature with needs that must be satisfied" (Meins, Fernyhough, Fradley, & Tuckey, 2001, p. 638). Reflective function, or the mother's ability to understand and "hold in mind" (Slade, Grienenberger, Bernbach, Levy, & Locker, 2005, p. 284) her own and her infant's mental states, is essential to creating a secure and comforting psychological environment for her baby. Terms such as mentalization, mind-mindedness, and reflective function, therefore, refer to the mother's ability to adopt and maintain a psychological perspective regarding her child; this capacity appears to be associated with responsive caregiving behavior (Grienenberger, Kelly, & Slade 2005) and with secure attachment (Sharp, Fonagy, & Goodyer, 2006). In turn, the self-reflective and interpersonal components of mentalization contribute, in important ways, to the infant's growing understanding of the self and others and to the developing capacity for emotional understanding, affect regulation, and empathy. In fact, deficits in mentalization, as are often observed in children who have been maltreated, have been found to result from, and to further impact, a disorganized attachment system (Cicchetti & Valentino, 2006; Fonagy, Gergely, & Target, 2008). When conceptualized in this way, mental functions that are part of the developing self-system, such as affect regulation and empathic abilities, may be seen to emerge within a relational context.

The concepts of mind-mindedness and maternal reflective function are consistent with Ainsworth et al.'s (1971) original notion that the sensitive mother is "capable of perceiving things from [the child's] point of view" (p. 43), thus making inferences from observing her child's behavior about her child's internal mental states. The "mind-minded mother" is sensitive to her child's behavior and is willing to adapt her responses in accordance with her interpretation of her child's cues. A mother of a child who forms a secure attachment to her is thus able to respond appropriately because she can accurately evaluate the reasons for her child's behavior and respond in accordance with that expression of need. Conversely, mothers of children who develop an insecure attachment either have more difficulty discerning why their child is behaving in a certain way or may be unwilling to understand the behavior; these mothers do not necessarily fail to respond to their baby but are more likely to respond in ways that do not match the need indicated by the child's behavior. Thus, for example, they might try to play with a sleepy infant, stimulate a baby when she needs to be calmed, or feed a baby who really just wants to engage in social interaction.

Five distinct measures of "mind-mindedness" were originally identified, each directed towards evaluating mothers' awareness and interpretation of their infants' behavior and mental processes (Meins, 2013; Meins et al., 2001). Four of these measures assess the mother's responses to her infant's

behaviors (maternal responsiveness to a change in the infant's direction of gaze; maternal responsiveness to the infant's object-directed action; imitation; encouragement of autonomy); these responses suggest the infant's behaviors are viewed by the mother as goal-directed and intentional. The final measure evaluates the mother's tendency to comment on her infant's thoughts and feelings (i.e., mental processes) by making appropriate mind-related comments. In a study of 71 infants and their mothers, ratings from play interactions when the infants were 6 months were examined in relation to attachment classifications at 12 months. Clear associations were found between higher scores for appropriate mind-related comments and secure attachment. Maternal sensitivity ratings (as measured by Ainsworth et al.'s (1971) sensitivity scale) were also found to be related to attachment security, though the frequency of appropriate mind-related comments was found to be an independent and stronger predictor (Meins et al., 2001). A reanalysis of the original behavioral mind-mindedness scales elaborates on these findings, explores the comparative strength of composite behavioral and verbal responses, and documents the independent role of appropriate and nonattuned mind-related comments in predicting attachment security at 12 months (Meins, 2013). These results confirm that mind-mindedness is best conceptualized as a multidimensional construct that may also relate to other developmental abilities in young children.

In another line of research, mind-mindedness, sensitivity, and attachment security were explored together (Lundy, 2003). In this work, sensitivity was conceptualized as interactional synchrony, where parents are seen to respond appropriately to their infants when their responses are reciprocal, mutually rewarding, and connected to the infant's preceding behavior (cf. Isabella, Belsky, & von Eye, 1989; Lundy, 2002). Both mothers and fathers were included and the frequency of interactional synchrony was found to mediate the relation between mind-related comments and attachment security at 13 months (Lundy, 2003). Thus, it appears that parents who frequently consider their infants' perspective are likely to engage in more synchronized interactions that, in turn, are associated with attachment security. Consistent with these findings, mind-mindedness, sensitivity, and attachment were also found to be associated when more rigorous, independent measures were used, thereby supporting the idea that sensitivity mediates between mind-mindedness and attachment security (Laranjo, Bernier, & Meins, 2008). Thus, just as Ainsworth and her colleagues postulated in their original conception of sensitivity, parents need to first understand their children's signals and cues before they can respond sensitively to them.

Whether paternal behavior is associated with attachment security is a question that has been explored more in recent years. Many researchers have assumed that similar findings regarding this link in mothers and their infants would be obtained in studies with fathers and their infants. However, the results are quite mixed. Early studies of fathers' interactions with their infants, either at 6 and 9 months of age or concurrent with Strange Situation

assessments at 12 months, found no association between paternal responsiveness and attachment security (Notaro & Volling, 1999; Volling & Belsky, 1992a). Modest, though significant, associations between paternal behavior and attachment security were found when assessed concurrently (Rosen & Rothbaum, 1993). A small, but significant, association was found between paternal sensitivity and infant–father attachment security in a meta-analysis of eight extant studies (van IJzendoorn & de Wolff, 1997). This association was weaker than what has been obtained in studies of maternal sensitivity and attachment, though the reasons for these differences are not readily apparent.

It may be that though levels of sensitivity and reciprocity are comparable, there are differences in the meaning of sensitivity and responsiveness across mothers and fathers. There may be distinct behavioral characteristics associated with coordinated, synchronous exchanges that are unique for mothers and for fathers with their children. And maternal and paternal sensitivity and responsiveness in infancy may differentially predict to developing attachments and other indices of adjustment and socio-emotional adaptation in childhood or adolescence (Feldman et al., 2013; Feldman & Eidelman, 2004; Kochanska et al., 2008). Moreover, controlling for maternal effects is necessary when assessing father effects, though very few studies have adopted this strategy (cf. Aldous & Mulligan, 2002; Stolz, Barber, & Olsen, 2005; Volling, Blandon, & Gorvine, 2006). Unique father effects may be especially evident when evaluating children's ability to negotiate conflict and manage aggression, whereas unique maternal effects have been observed in the ability to engage in reciprocal dialogues within positive social interactions (Feldman et al., 2013). Studies that continue to examine the unique and shared influences that maternal and paternal behaviors have on their children's developing attachments and other social competencies are critical to deepening our understanding of the importance of caregiving.

Mediational analyses reveal that mothers and fathers have different patterns of influence on their children's development (e.g., Kochanska et al., 2008; Lindsey, Cremeens, Colwell, & Caldera, 2009). These unique influences may have to do with how affectionate mothers and fathers are, how much time they spend with their children, their ability to connect and respond appropriately to their children, or their own attachment representations (Caldera, Huston, & O'Brien, 1995; Cox, Owen, Henderson, & Margand, 1992; van IJzendoorn, 1995). Whether these differences in the ways that mothers and fathers influence their children impact later social and emotional development is an important question we will return to later on.

Temperament

Questions about the associations between attachment and temperament in infancy, childhood, and adolescence have been posed for several decades (see, for example, Goldsmith & Alansky, 1987; Goldsmith & Harman,

1994; Seifer & Schiller, 1995). Overlapping behavioral characteristics that are relevant to theories of attachment and temperament, and interpretive claims made by attachment and temperament theorists, contribute to the controversy (see Vaughn, Bost, & van IJzendoorn, 2008, for a comprehensive review). Adding to this complex terrain is the issue that while there is a fairly coherent theoretical context within which attachment relationships are understood, and a well-validated and widely used procedure for assessing qualitative differences in attachment security (i.e., the Strange Situation), the conceptualization and measurement of temperament is more complicated. There are multiple theoretical approaches to the study of temperament, each with its own definition of, and measurement strategy for capturing, possible dimensions (Goldsmith et al., 1987). Despite these conceptual differences, most theorists now agree that temperamental variations appear early in life, are strongly influenced by biological factors, and show a fair degree of individual consistency over time.

A substantial body of research has continued to explore and elaborate many of the theoretical ideas central to temperament research (for a review, see Shiner et al., 2012). Current conceptions of temperament have more carefully elaborated the complex ways in which biological, genetic, and environmental factors interact across development and influence temperament. Experience and context are now viewed as playing a critical role in impacting the expression of a broader range of temperament dimensions that include activity, reactivity, emotionality, and sociability as well as attention and self-regulation (Rothbart, 2011; Zentner & Shiner, 2012). When considered in relation to the development of early attachments, questions about individual differences in temperament often focus on the "goodness of fit" between the infant and the mother (Chess & Thomas, 1984). When the infant's temperament and the caregiver's expectations, attitudes, or behaviors do not match, the infant is at risk for poor outcomes. Certain temperamental qualities, such as irritability, may lead to positive developmental outcomes (e.g., secure attachment) when there is a good caregiving environment that can sensitively respond to the particular challenges this temperamental quality presents; alternatively, when the caregiving environment is less optimal, infant irritability may be a risk factor for insensitive or harsh caregiving and negative developmental outcomes may arise (e.g., insecure attachment). Thus, temperamental characteristics may make some infants differentially susceptible to environmental influences (van IJzendoorn & Bakermans-Kranenburg, 2012). Infant temperament may also influence the caregiving context, parental behavior, and the attachment relationship (Bates, Schermerhorn, & Petersen, 2012). Considered together, both infant and parent continually influence one other as part of a dynamic, transactional process.

There are several ways of interpreting the data that has emerged from systematic exploration of the attachment–temperament link (see Vaughn et al., 2008, for a comprehensive review). First, the view that temperamental

predispositions directly determine individual differences in attachment security has not been supported by existing empirical work (see, for example, Seifer, Schiller, Sameroff, Resnick, & Riordan, 1996). Behavioral indices of temperamental variations are not directly linked, when measured either concurrently or predictively, to differences in patterns of attachment. Proneness to distress, for example, a temperamental quality, is not associated with only one pattern of attachment. Securely attached babies may be distressed easily by separations in the Strange Situation, but the parent's return to the room is sufficient for the child to derive comfort in her presence and to return to exploration. By contrast, insecure anxious-resistant babies may be distressed easily by the separation as well, but their exploration both before and after the separations may be limited by their lack of confidence in being able to use the caregiver as a secure base. Thus, babies who are prone to distress, who are highly inhibited, or who have "difficult" temperaments, given the "right" kind of care may develop a particular pattern of attachment because there are multiple pathways to both security and insecurity (Sroufe, 2005). Therefore, temperament alone does not determine attachment security. Additionally, though often treated as a static trait, temperamental qualities have been found to change and may even be impacted by quality of care provided by parents (Belsky, Fish, & Isabella, 1991).

Second, the view that individual differences in temperament create a potentially more challenging context for parents to provide sensitive care for their children has only been weakly supported. It may that an infant's "difficult" temperament makes it more difficult for parents to provide optimal care. Or perhaps, when parents are already strained by psychological, social, or economic stressors, an infant's difficult temperament introduces another stress for the parent to manage (Vaughn et al., 2008). But not all observers would agree on what makes an infant "difficult". Moreover, temperament reports from different raters are only moderately associated (e.g., Seifer, Sameroff, Barrett, & Krafchuk, 1994), suggesting that observers' judgments may vary depending on their relationship to the infant being rated. And when adequate help and support is received from family members and friends, difficult infants are easier to manage and infants who are rated as "irritable" are no more likely to be rated as insecurely attached than are infants rated as "easy" (Crockenberg, 1981). By contrast, mothers with difficult infants who are socially isolated or have little support from other adults have more difficulty developing a secure attachment with their babies (Levitt, Weber, & Clark, 1986).

Thus, when examined alone, distinct indices of temperamental qualities have not been found to influence parenting and to be associated with attachment security (Vaughn et al., 2008). It is more likely that temperament indirectly influences parental behavior and, when considered together with other situational and contextual stressors, impacts the developing attachment relationship. This position emphasizes the contributions of both caregiving behaviors and temperamental factors in determining attachment security.

Genetic and Environmental Influences on Attachment Security

There is now considerable support for the view that the quality of early attachment relationships results from the dyad's history of interaction, influenced by temperamental characteristics of the child and parental caregiving behaviors. If temperament alone predicted attachment patterns, then we would expect infants to engender comparable caregiving behaviors and develop a similar pattern of attachment to both parents. Similarly, if parental caregiving behaviors were all that was relevant, we would expect older and younger siblings to have the same quality of attachment to the same parent. However, extant research indicates that infants' attachments to their two caregivers are only modestly congruent (Fox, Kimmerly, & Schafer, 1991; Rosen & Burke, 1999; Sagi et al., 1995; Steele, Steele, & Fonagy, 1996). And two siblings do not necessarily have the same quality of attachment to the same caregiver, either when assessed when the two children are the same age (e.g., at 12 months (Ward, Vaughn, & Robb, 1988)) or when attachment is assessed at the same time using age-appropriate measures for younger and older siblings (Rosen & Burke, 1999). Thus, it appears that patterns of attachment reflect the interactional history of the dyad over time.

But are there genetic factors that influence attachment security as well? Sisters and brothers raised in the same family have parents who are likely to be similarly sensitive or insensitive to their children, to maintain a stable capacity for mentalization, mind-mindedness, or reflective function and, therefore, to relate in similar ways to their children. However, despite these shared aspects of the siblings' environment, there are also differences in how parents relate to each of their children, creating unique, different, or nonshared environmental influences (Hetherington, Reiss, & Plomin, 1994; Plomin & Daniels, 1987). Moreover, genetically determined child characteristics, such as temperament, influence mothers and fathers' capacity to respond sensitively to their child or may make children differentially susceptible to parental influences. Studying pairs of twins provides a unique opportunity to explore, within similar childrearing contexts, the influence of genetic factors on attachment security. The degree of concordance in attachment classifications would be expected to be significantly greater among identical (monozygotic (MZ)) than fraternal (dizygotic (DZ)) twins (or nontwin siblings) if genetically based child factors influence parental sensitivity (Goldsmith, Buss, & Lemery, 1997; Scarr & McCartney, 1983).

There are several studies that have assessed infant–mother attachment security using samples of MZ and DZ twins. For example, 60% of MZ twins and 57% of DZ twins, in a total sample of 157 twelve-month-old twin pairs and their mothers who were seen in the Strange Situation, were found to be concordant in attachment classifications (Bokhorst et al., 2003). Using behavior genetic modeling, 52% of the variance in attachment security within the organized secure and insecure categories was found to be attributable to shared environmental effects (for example, parental behaviors are similar

across siblings), while the remainder of the variance was explained by nonshared environmental factors (for example, parental behaviors that are unique to a particular dyad) and measurement error. Substantial associations between twins' secure and insecure classifications were also obtained in a subsequent analysis of the data, excluding twin pairs with disorganized attachments, with similarities in shared environmental influences (Fearon et al., 2006). Moreover, nonshared environmental effects were found to create an inverse relation between sensitivity and attachment such that greater sensitivity to one, but not the other, twin was associated with a lower likelihood of secure attachment in the first twin. Thus, the relationship that the parent has with one twin appears to influence attachment security with the other twin. Comparable findings emerged from a study of older preschoolers, where high concordance was found in both MZ (70%) and DZ (64%) twin pairs (O'Connor & Croft, 2001). Again, these high rates of concordance indicate environmental, rather than genetic, influences on parent–child attachment relationships. By contrast, substantial genetic effects, and no shared environmental effects, were found in a sample of 18–24-month-old twin pairs, where 68% of the MZ twins, and only 39% of the DZ twins, were concordant in attachment security using an adapted attachment measure (Finkel, Wille, & Matheny, 1998). Taken together, these results suggest that there is a significant effect of shared (and nonshared) environmental factors on attachment security, while genetic effects appear to have relatively less influence (Belsky & Fearon, 2008). The similarity in twins' attachment classifications may be partially explained by consistencies in parental sensitivity; there is still a gap in our ability to account for nonshared influences on attachment relationships within the family.

In particular, this work highlights the significance of parental behaviors and helps to clarify their importance for attachment security in sibling and twin pairs. While parental sensitivity plays a critical role in influencing concordance in sibling attachment, this does not imply that the way sensitive parental behavior is expressed needs to be identical across all children in the same family. Parental behavior may objectively appear to be different when evaluated independently of interactive context, though it may still be "functionally similar" (O'Connor & Croft, 2001) in its degree of sensitivity to siblings' differing needs for affection, warmth, or control, or to siblings who are differentially responsive to parental behaviors. Thus, a secure attachment relationship may be the consequence of nonshared experiences, whereby different parenting behaviors may serve the same goal of sensitive and responsive care offered by the parent in response to each child's unique needs and temperamental characteristics. Moreover, developmental differences between siblings of different ages, and in the siblings over time, require frequent accommodations in discrete parental behaviors, though there may be consistency in overall parental sensitivity and responsiveness. However, even among identical (MZ) twins, there is only moderate similarity in parental behavior (Plomin, 1994). And, importantly, developmental changes in genetic influences, as well as in shared and nonshared environmental influences, also need to be considered

given that shared environmental factors tend to be the largest in early childhood (McCartney, Harris, & Bernieri, 1990). Differential parental behavior, therefore, may be expected and necessary as parents accommodate their behavior to the particular needs of each of their children; these nonshared experiences may reflect changing contributions of genetics and environment to parental sensitivity and to the development of attachment relationships (Fearon et al., 2006).

Studies of siblings' and twins' attachment relationships with the same parent challenge attachment researchers to continue to explore the ways in which infant characteristics, parental behaviors, and familial factors may, alone or in combination, influence attachment security. Children's temperamental predispositions may be modified with time and maturation and these changes will undoubtedly impact parental behavior and the quality of dyadic interaction (e.g., Belsky et al., 1991). Similarly, parental behavior may alter the expression of individual differences in the child's particular temperamental profile and influence the developing attachment relationship. The family context, including marital relationship quality, psychosocial stressors, and availability of social supports, needs to be considered as well. Considered together, it appears that patterns of attachment reflect the dynamic interplay of genetic and environmental factors as the child and parent negotiate their relationship over time.

What Are the Developmental Consequences of Early Attachment Relationships?

John Bowlby (1969/1982) originally introduced the theoretical notion that qualitative differences in attachment security have significant implications for children's concurrent and later development. Ainsworth's development and validation of the Strange Situation procedure (Ainsworth et al., 1978) allowed Bowlby's idea to be empirically tested. Researchers have followed infants who were originally seen in the Strange Situation when they were 12 months of age. In general, the extant studies, spanning time periods ranging from several months to several decades, support the idea that secure attachment is related to better functioning in a variety of social, emotional, and cognitive domains. Thus, individual differences in attachment security appear to be associated with both concurrent and later development of exploration and play, curiosity, behavior with peers and friends, frustration tolerance, language development, self-recognition, quality of peer relationships, ego resilience and ego control, behavior problems, and many other developmental outcomes. There are important questions that need to be asked about *why* these associations might be expected and *under what circumstances* we would anticipate them to be found. It is also essential to understand what *mechanisms* or *processes* underlie these associations. These are the issues to which we will now turn our attention.

The concept of "internal working models" was introduced by Bowlby (1969/1982, 1980, 1988) to account for the internalized cognitive representations of relationships and the self that result from early attachment experiences. Bowlby argued that the infant who has early experiences with a sensitive caregiver expects similarly sensitive encounters in new relationships and behaves in ways that elicit this support. These early attachment experiences also lead the infant to view the self as worthy of sensitive and responsive care and to seek out experiences that confirm this perspective. Thus, working models are "interpretive filters through which children reconstruct their understanding of new relationships and experiences…(and) internalize conceptions of themselves from early relational experiences that form the basis for developing self-concept and other self-referential beliefs" (Thompson, 2008, p. 350). These models guide the ways in which children relate to others and think about the self, thereby confirming or disconfirming expectations about the self and relationships.

Working models are thus constructed during infancy. Secure infants, for example, use their parents as a base from which to explore, seek interaction and proximity when uncertain or frightened, derive comfort when distressed, and resume exploration when calmed. Their internal working models incorporate a view of their attachment figure as sensitive, available, and responsive in meeting their attachment and exploratory needs. Insecure-avoidant infants develop a working model of parents as unable to provide a safe haven when the infant needs one. This failure on the part of the parent leads the infant to turn away from the attachment figure, avoiding proximity and interaction when stressed. Insecure-resistant infants view their parents as unpredictable. They try to stay close to them in case they need them, but cannot derive comfort from them in ways that promote successful exploration. These organized strategies for managing attachment relationships, whether secure or insecure, are contrasted to the internal models of insecure-disorganized infants who view their parents as a source of danger or fear, leading them to behave in ways that are disoriented and/or frightened. Thus, internal working models are organized around the history of infant–caregiver interactions.

Internal working models may serve as the primary mechanism by which continuity is maintained between early attachment and later functioning. These models are developing over time as well, incorporating attributes of multiple caregivers, representations of significant attachment-related experiences, and developing understanding of the self and of others (Bretherton, 1991, 1993; Thompson, 1998). Additionally, distinct components of these models (e.g., autobiographical memories, relational expectations) may develop at varying times and have different influences on outcome measures during particular developmental periods. For example, because self-representations are expanding and increasingly refined at about the age of 5 or 6 years, a secure attachment at this age may be more influential on self-image than a secure attachment during infancy (Thompson, 2008). Finally, internal working models are formed, in part, as a result of shared conversations with others

about the self, relationships, and experiences (Fivush, 1994; Oppenheim & Waters, 1995). Thus, caregivers influence working models, both in the care they provide to their children and in their interpretations offered in discourse about their children's relational experiences (Thompson, 2008).

There are, of course, circumstances under which we might not expect there to be continuity between early attachment and later social, emotional, and cognitive development. Family crises, marital disruption, life transitions, and other normative and unexpected events may influence the quality of the parent–child relationship. If there is continuity in the care provided by parents during these challenging periods, then this may provide the bridge between early attachment security, developing internal working models of the self and relationships, and later outcomes (Thompson, 2008). If, however, parents find it to be more difficult to maintain their responsiveness to their children when challenged by marital or financial stress, or to respond sensitively and appropriately to their child who is experiencing a normal developmental transition (such as problems when entering kindergarten), then these relational changes may disrupt the associations between early attachment security, internal models of self and relationships, and later developmental outcomes. Thus, when the same conditions that foster a secure attachment relationship are maintained over time, it is more likely that children will benefit from the continued support provided by sensitive parenting and will be open to the caregiver's socialization influences. Under these circumstances, attachment security will more likely be associated with a more positive view of the self, greater competence in social interactions, increased curiosity, and openness to experiences that promote cognitive growth. The initial internal models that guide the child's view of relationships and of the self continue to be modified and refined in the context of later interactions. If there is continuity in the quality of parent–child interactions, then we would expect there to be links between early attachments and later adjustment (Thompson, 2006). However, when the parent–child relationship is disrupted, or the quality of care is diminished, early attachments may not be associated with subsequent developmental outcomes.

Several significant longitudinal studies have explored these predictive links between early attachment and later competence (see Cassidy & Shaver, 2008; Grossman, Grossman, & Waters, 2005; Sroufe, Egeland, Carlson, & Collins, 2005a). Generally, there are three distinct outcomes on which these studies have focused: (1) functioning in interpersonal relationships, particularly peer interactions (e.g., Erickson, Sroufe, & Egeland, 1985; Schneider, Atkinson, & Tardif, 2001) and later romantic relationships (Roisman, Collins, Sroufe, & Egeland, 2005); (2) internalizing problems (e.g., Bosquet & Egeland, 2006; Groh, Roisman, van IJzendoorn, Bakermans-Kranenburg, & Fearon, 2012); and (3) externalizing problems (Fearon, Bakermans-Kranenburg, van IJzendoorn, Lapsley, & Roisman, 2010). The results tend to support the notion that individuals who are securely attached are more competent in their interpersonal relationships and exhibit lower levels of internalizing and externalizing

behaviors. However, it is important to note that there is a dearth of longitudinal studies exploring attachment and later competence across socioeconomic and cultural groups, thereby limiting the conclusions that may be drawn from the extant body of research.

Moreover, there are an astounding number of short- and long-term follow-up studies that have explored many other developmental outcomes of early attachment relationships. There are some investigations that focus on relational outcomes with parents, siblings, peers, friends, and romantic partners. There are others that examine personality outcomes, self-concept, social cognition, and conscience development. And still other research has explored emotion regulation and emotion understanding (see Thompson, 2008, for a review). Generally, these studies support the notion that secure attachment relationships during infancy and early childhood provide children with many advantages and more optimal outcomes, regardless of the particular areas of development evaluated. Importantly, a few studies have examined attachment to both mothers and fathers and considered their association to later outcomes. When children are insecure in their attachment relationships with both parents at 15 months of age, they exhibit more behavior problems as reported by their teachers at 6½ years and by their parents at 8 years of age. A secure attachment with at least one parent appears to offset this risk, though a secure attachment to both parents does not provide any more protection than a secure attachment to only one parent (Kochanska & Kim, 2013). Insecure attachments to both parents at 25 months of age are also associated with more behavior problems 6 years later, though fewer behavior problems and greater competence are observed when children with insecure attachments to mothers have secure attachments with their fathers (Boldt, Kochanska, Yoon, & Nordling, 2014). Exploring the mechanisms that account for these associations, and continuing to examine the predictive power of attachment to both mothers and fathers, are important areas for future research.

There are several limitations to extant studies as well (see, for example, Roisman & Groh, 2011). Most importantly, the research does not disentangle the many possible reasons as to *why* early attachment security is related to later developmental outcomes. However, some significant clues have emerged. Early attachment may be more predictive of later development when there is continuity in the quality of parental caregiving (Sroufe et al., 2005a). High-quality mother–child conversations that elaborate and support developing social interactions and emotional competencies may be relevant as well (Fivush, 1994; Raikes & Thompson, 2006). Internal working models may direct memory and attention to experiences and relationships that are consistent with prior internal cognitive representations, thereby supporting the construction and maintenance of stable models over time (Bretherton & Munholland, 2008). These models may grow with conceptual development across childhood and adolescence. Thus, advances in event representation, theory of mind, and autobiographical memory may lead to consistencies in the ways in which social experiences are understood, encoded, and represented,

thereby contributing to the understanding of the self in relation to others and to the continued use of attachment-related working models (Thompson, 2008). Children who are securely attached may have certain social-cognitive advantages that influence their social competence (Cassidy, Kirsh, Scolton, & Parke, 1996). And attachment security serves as a moderator in influencing the impact of parenting strategies on the child's moral development (Kochanska, Aksan, Knaack, & Rhines, 2004).

Given the predictive power of early attachment security, we need to ask what happens when there are problems in negotiating an early secure attachment relationship. Are there compensatory processes that may influence attachment relationships? For example, is it possible for an individual who has a history of an early, insecure attachment in infancy to achieve "earned security" (see, for example, Roisman, Padrón, Sroufe, & Egeland, 2002) or to develop secure representations of attachment in adulthood? Indeed, it has been demonstrated that adults who report early negative relationships with attachment figures have the capacity to turn to an alternative figure for comfort and emotional support when vulnerable or stressed and demonstrate the ability to ultimately form secure attachments with their own infants (Saunders, Jacobvitz, Zaccagnino, Beverung, & Hazen, 2011). Additionally, there may be certain developmental periods when the associations between early attachment security and later developmental outcomes are strongest. For example, links between attachment and peer functioning have been found to be of larger magnitude for peer relationships in the middle childhood and adolescent periods than for the early childhood period (Schneider et al., 2001). Mother–child and father–child attachment relationships may also differentially influence aspects of social and emotional functioning, depending upon the developmental periods assessed. Thus, future research needs to incorporate a developmentally sensitive lens when exploring the outcomes of early attachment relationships. Alternative pathways to achieving attachment security need to be better understood. Finally, examining the individual, relational, and contextual factors that may underlie the associations between attachment and later development, and adopting more sophisticated mediational models, represent important directions for future research.

Attachment Relationships Beyond Infancy

Why Was Attachment Security Initially Studied Only In Infancy?

There are several theoretical and methodological reasons as to why attachment theory and research began with an emphasis on the infancy period (Schneider-Rosen, 1990). Psychoanalytic thinking underscored the importance of significant early relationships and evolved to include the notion that anxiety is a signal to the threat of a meaningful interpersonal loss (Freud, 1940/1964). Early relationships were seen as the prototype for later relationships and for

the emergence of the self (Breger, 1974; Erikson, 1950/1963; Klein, 1976; Loevinger, 1976; Mahler et al., 1975; Sandler, 1975; Sullivan, 1953). Attachment theory, with its roots in psychoanalytic thinking, therefore emphasized the importance of the infancy period. The first meaningful relationships, initially viewed as with only mothers, developed during the first year and were seen to have an enduring impact on the child's development (Ainsworth, 1969; Bowlby, 1958, 1969/1982).

Early attachment researchers adopted an organizational approach to development, with its emphasis on a set of developmental tasks or issues around which behavioral reorganizations occur (Sroufe, 1979; Sroufe & Rutter, 1984). According to this organizational perspective, development is a coherent process involving an integration of emerging capacities in the social, emotional, and cognitive domains. Early adaptation is thought to promote concurrent and later adaptation within and across domains, given consistency in the caregiving environment. Alternatively, difficulties in the resolution of stage-salient tasks may result in the development of compensatory mechanisms, which in turn create alternative pathways to achieving competence or leave the child vulnerable to developing psychopathology (see Cicchetti & Schneider-Rosen, 1984, for a review). Within this organizational perspective, establishing an attachment relationship is the first stage-salient task of infancy. Researchers, in their early efforts to demonstrate both the construct and predictive validity of the attachment construct, focused on individual differences in attachment and the role these early relationships play in influencing subsequent development. By then examining new competencies or tasks, such as exploration or mastery in the toddler period, negotiation of peer relationships in preschool, or curiosity and persistence in the early school years, researchers inadvertently perpetuated the idea that attachment relationships decrease in importance relative to these emerging abilities. But, in fact, we now know that attachment relationships remain critical to the individual in childhood and adolescence and remain so through the entire lifespan.

Attachment researchers highlighted the idea that achieving organized, predictable patterns of behavior for managing attachment-related needs was an essential task in infancy. While a secure pattern of attachment was seen to be the optimal outcome for most infants, in certain dyads and in particular caregiving environments an insecure pattern may be more adaptive (cf. Fonagy & Target, 2007; Schneider-Rosen, Braunwald, Carlson, & Cicchetti, 1985). Thus, the consideration of diverse populations, such as children raised in homes where there is trauma or abuse, encouraged attachment researchers to evaluate their theoretical assumptions, thereby extending and refining their work in significant ways. Additionally, researchers began to study children's attachments to both their mothers and fathers (e.g., Diener, Mangelsdorf, McHale, & Frosch, 2002; Verissimo et al., 2011; Rosen & Burke, 1999), recognizing that children develop unique relationships with each of their attachment figures. Attachment has been studied in infant–parent dyads from different socioeconomic backgrounds, as well as from families where there are