INFANCY

Development from Birth to Age 3

THIRD EDITION

Dana Gross

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St. Olaf College

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To John, Rolf, and Simon

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BRIEF CONTENTS

CONTENTS

PREFACE

The focus of this book is on current research, theory, practice, and policy about development from birth to 3 years of age. It developed in response to my experience using other infancy books in my own courses with undergraduates. As I searched for a book that was appropriate in content and presentation, I discovered that many of the available texts were either too advanced or too basic. The overly advanced books tended to be encyclopedic in their coverage, often gave only minimal coverage to important practical topics, and seemed not to have been written with teaching and learning in mind. The overly basic books tended to leave out information about how research is conducted, focused almost exclusively on practical topics, and lacked advanced critical thinking approaches. Some books adopted a chronological approach that missed opportunities to highlight the coherence, continuity, and change in specific aspects of development from birth to age 3. This book, by contrast, provides students with information about research that enables them to understand methodological issues, explore both practically and theoretically important topics, and engage in thinking critically about development from birth to age 3.

THE CHALLENGE AND OPPORTUNITY OF REVISION

As I revised this book, I made every effort to incorporate suggestions from users of the previous editions. Based on this feedback, and the comments of anonymous reviewers, I made two significant structural changes. First, I divided the single chapter on cognition, learning, and intelligence into two chapters—one focusing on play, Piaget, and Vygotsky, and the other examining cognitive science perspectives and intelligence. Second, I eliminated the final chapter (Music, Media, and Computers) but distributed significant portions of the material into other chapters.

Throughout, I sought to retain and enhance the best features and qualities, while updating the research literature and adding exciting new content to reflect perspectives that had emerged or grown in prominence. Examples of these changes are listed here:

- Discussion of epigenetics (Chapter 1)
- More information about functional Near Infrared Spectroscopy (fNIRS), eye tracking, and other developmental neuroscience methods (Chapters 2, 8, and 9)
- Updated coverage of genetics, assisted reproductive technology, and prenatal development (Chapter 3)
- Additional information about global public health initiatives, such as the United Nations Millennium Development Goals (Chapters 4 and 5)
- Expanded information about brain development (Chapter 5)
- Updated information about the Bucharest Early Intervention Project and the English and Romanian Adoptees (ERA) Study (Chapter 5)
- Updated information from DSM-V about Autism Spectrum Disorder (Chapter 9)

ENGAGING, THOUGHT-PROVOKING CHAPTER OPENERS

Each chapter begins with a thought-provoking, real-life scenario that draws students into the topic from the beginning and enables them to relate subsequent material to specific questions raised at the outset. Examples of these scenarios include infants being sent to wet nurses in eighteenth-century Paris (Chapter 1), linguist Werner Leopold's classic longitudinal study of his infant daughter Hildegard's development

as a bilingual child (Chapter 2), the reasons some families search for half-siblings of children created through donor eggs or sperm (Chapter 3), and health and physical growth—including brain development—in an infant adopted from an East European orphanage (Chapter 5). Chapter 10 begins with questions about baby shower gifts and the things that all infants need, Chapter 11 asks students to think about what it is that makes the thousands of infants who are named Noah or Emma each year unique.

THE BROADER HISTORICAL CONTEXT

In a number of chapters, streamlined historical information highlights how far we have come in our understanding of the first 3 years of life. For example, Chapter 1 includes examples of historical perspectives on childhood and the study of child development; Chapter 3 considers remarkable discoveries about genetics; and Chapter 4 discusses trends in childbirth procedures and options. Chapter 12 describes current research on early childcare and early intervention as well as trends in women's employment, parental leave policies, and childcare for infants and toddlers.

POLICY CONSIDERATIONS

Students everywhere want to know more than just what the latest research shows—they want to know what they can *do* with their knowledge.

Policy considerations included in this book answer those important "so what next?" questions and call attention to prominent issues in the field of child development. Chapter 5, for example, notes that the harm caused by lead exposure led to changes in legislation regarding formulas for paint and gasoline; that public health campaigns to keep babies safer by placing them on their backs to sleep led to reductions in the rate of sudden infant death syndrome; and that awareness of the benefits of human milk led to the establishment of public health goals and hospital practices to support new mothers in breastfeeding. Chapter 12 compares the implications of parental leave policies in the United States and in other countries.

PRACTICAL AND THEORETICAL ISSUES

This book balances practical and theoretical issues. Chapter 6, for example, considers the implications of motor and locomotor development for parents and caregivers who want to make the environment safe for active babies and toddlers. Chapter 9 discusses prelinguistic communication and the value of using gestures to help toddlers and caregivers communicate before real words or signs appear. Chapter 10 describes some of the factors that can smooth young children's transition to siblinghood and help to incorporate the new sibling system into existing family relationships.

DIVERSITY AND MULTICULTURAL EXPERIENCE

Students everywhere want and need to understand interconnections between cultural, institutional, familial, and personal experiences. To address these concerns, virtually every chapter incorporates issues of diversity and multicultural experience, illustrating how nature and nurture work together. Chapter 5 examines nutritional needs and dietary patterns in the United States as well as the effects of malnutrition, which is a significant problem for infants and toddlers in many other parts of the world. Chapter 6 notes cultural differences in parents' beliefs about the experiences needed for healthy physical growth and motor development. Chapter 7 introduces the notion of diversity by comparing examples of guided participation in different cultures. Chapter 10 encourages students to think about diversity in infant–caregiver relationships and different cultural expectations and beliefs about infants' development

and the roles that mothers and fathers (and others) play. Chapter 12, the review of childcare, discusses the inclusion of children with disabilities, and the examination of early intervention addresses the impact of poverty on development from birth to age 3.

PEDAGOGICAL ELEMENTS

Last, but certainly not least, I have included a number of pedagogical elements that I was not able to find in most of the other infancy books I had used or examined. Each chapter contains a chapter preview, summary and conclusion section, questions for reading and discussion, and clear definitions of key words in a marginal glossary. With critical thinking skills in mind, many of the questions at the end of each chapter invite students to apply their knowledge or consider it in light of other evidence. There are also boxed features in every chapter, covering topics such as Prenatal Effects of the Zika Virus (Chapter 3), Progress toward Eliminating Mother-to-Child Transmission of HIV (Chapter 3), The Effect of Television and Digital Media on Infants and Toddlers (Chapter 8), The Mozart Effect: How Does Music Affect Early Cognitive Development? (Chapter 8), and The Mother–Child Longitudinal Study of Attachment (Chapter 10).

ANCILLARY MATERIALS

This book is accompanied by instructor ancillaries written by the author and designed to enhance the learning experience.

Instructor's Manual and Test Bank. The Instructor's Manual includes a sample syllabus and a sample library research paper assignment created by the author. For each chapter in the text, the Instructor's Manual provides the chapter "at a glance," chapter outline, key words with definitions, questions for reading and discussion, a lecture launcher, hands-on learning activities, and online resources. The Test Bank includes multiple choice questions and essay exams accompanied by study sheets. The Instructor's Manual and Test Bank are available to adopters for download on the text's catalog page at https://rowman.com/ISBN/9781538106723.

PowerPoint Slides. The PowerPoint slides provide the tables and figures from the text. The PowerPoint presentation is available to adopters for download on the text's catalog page at https://rowman.com/ISBN/9781538106723.

I hope that you enjoy and learn from this book. We know so much about the first 3 years of life, but in many ways the study of infants and their development is still in its own infancy. As new discoveries are made, it is my wish that the chapters in this book will enable you to appreciate and make sense of that information, evaluating it and applying it to the babies and toddlers you know. I would love to hear from you, if you have comments or suggestions. Feel free to get in touch with me at grossd@stolaf.edu.

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CHAPTER 1

Beliefs about Babies: Historical Perspectives on Children and Childhood

SUPPOSE YOU HEARD ABOUT PARENTS, living in a large city, who sent their newborn infant to live with an unrelated woman in the countryside until the age of 2 to 3 years. The woman—the family's wet nurse—would have responsibility for all aspects of caring for the baby, especially nursing the infant with her own breast milk. Paid to care for several infants in this way, she might supplement their diet with a concoction called pap, consisting of a small amount of milk, simmered with flour, honey, and perhaps a bit of watered-down wine or beer. She might chew bread or meat, allowing the food to mix with her saliva, before placing it in the infant's mouth. If the infant became ill, the wet nurse might pray to a saint to provide a cure.

Would you approve of this diet and the care being provided? Would you have any concerns about the baby's well-being? How would you feel about the parents, knowing that they had made these arrangements partially in order to make it easier for the mother to return to an active social life and partially in order not to violate a taboo against sexual relations while nursing? Would your opinion of the parents change if you were told that 95 percent of children born in their city that year were nursed by wet nurses for similar reasons?

As someone living in the twenty-first century, you almost certainly find this scenario objectionable, but if you were living in Paris, France, in the eighteenth century, you probably would see very little

to criticize (Fontanel & d'Harcourt, 1997). Moreover, in the absence of specialized pediatric medicine, which was not developed until the late nineteenth century, you probably would not disagree with the wet nurse's efforts to treat the infant's illness. These divergent views about the proper care and feeding of infants reflect prevalent popular and scientific beliefs then and now. Our focus in this opening chapter is on the events that have transformed, and continue to transform, our thinking about infancy and childhood. We consider historical changes in views about the nature of children and childhood itself as well as transformations in family structure, health, and education. These evolving perspectives and practices are fascinating, but as we discuss next, they are not the only reason to study infants and their development from birth to age 3.

This chapter begins with a number of compelling reasons to study infants from birth to age 3. You will then learn about recurring themes in the study of child development: the extent to which development occurs in stages versus continuous change; the contributions of heredity and the environment; the ways in which infants are both active and passive participants in their own development; the relationship between normal and atypical development; and the profound impact of culture and context. Given the importance of the historical context, the chapter highlights major trends and turning points in perspectives on infants and their development, as well as some of the key figures in the history of child development and the scientific study of children.

WHY DO WE STUDY INFANTS?

Why are you interested in studying development from birth to age 3? Do you want to understand a particular infant or toddler better? Are you planning to work with babies or young children in your future career? Do you want to learn how to be an effective parent? There are many good reasons to study infants.

Development as Transformation

From birth to the age of 3 years, infants gain weight and grow in length, learn new skills, and demonstrate increasing coordination and intentionality in using those skills. Infants who initially can only swipe at toys that are attached to the front of their car seat or high chair are soon able to touch and manipulate those toys more intentionally. By 3 to 4 months of age, newborns learn to roll over, then crawl, and are on their way to independent walking by the time they celebrate their first birthday. The ability to communicate through language also emerges during the first three years of life, opening new opportunities to understand as well as influence young minds. Even before they can communicate through language, however, babies express their feelings and show preferences for parents and other caregivers, reflecting a capacity for memory

and for forming special relationships. Which transformations during infancy do you find most interesting?

Many infants and toddlers are cared for by their grandparents.

Impact of Early Experience

From birth to age 3, there is tremendous variability in infants' early experiences. Some infants are cared for at home by parents, older siblings, grandparents, or other adults, whereas other infants enter full-time group childcare at an early age. How do parents' choices affect their children's early development? Are there long-lasting effects of early experiences? Does early enrichment make a difference later in childhood? Is it possible to overcome the negative effects of early deprivation and adversity? These and other examples that you may wonder about raise important questions about the degree to which humans are resilient early in life and the effects of experience during childhood and beyond.

RESEARCH METHODS AND TOOLS

Imaging technology provides glimpses of the developing fetus, and other prenatal tests give expectant parents and doctors more information than ever before. Advances in technology enable researchers to examine the infant brain and to understand how it is shaped by experience. New understanding of genetics offers intriguing possibilities to predict, and even influence, infants' health from the earliest point in development. Researchers' selection of particular methods and tools enables them to ask infants profound questions long before the subjects of their studies are able to utter their first word.

Interdisciplinary Collaboration

Pediatricians, early childhood educators, social service providers, researchers in child development, and public policy makers have never been more open to sharing knowledge and working together to improve the conditions in which infants live and, hopefully, thrive. Economists have recently become involved in evaluating intervention programs for infants and toddlers in an effort to identify programs that are worthwhile and cost-effective. Historians too have taken an interest in understanding changes in children's experiences over time as well as reconceptualizations of the nature of childhood and children.

RECURRING THEMES IN THE STUDY OF CHILD DEVELOPMENT

As long as there have been infants, there have been beliefs about the factors that affect their development. These beliefs have been incorporated into formal theories in disciplines such as psychology

Development from birth to age 3 may seem either abrupt or continuous, depending on how frequently children are observed.

and sociology as well as folk theories held by parents and the general public. Theories about child development are usually specific to particular **developmental domains**, specific areas of ability or experience. This means that they tend to focus on topics such as cognition, language, memory, relationships, or emotion, rather than explain or unify multiple areas of development. In this section, you will learn about some of the themes that all developmental theories address.

The Path of Development: Stages versus Continuous Change

The field of child development has many theories that describe development as occurring in a **stagewise** process, with qualitatively different abilities or characteristics emerging out of the transition from one stage to the next. Stage theories emphasize the sort of impression that an infrequent observer might have of the same child over the first three years of life. At an early visit, the infant would be focused inward, fascinated by his or her own fingers or toes; he or she might show a strong desire to remain close to the parents. A visit several months later, by contrast, would reveal an infant who is eager to explore the environment, crawling or cruising away from the caregiver. In this sense, the child would appear to have qualitatively different interests and abilities at the second visit than at the first. By the time of a third visit, when the child is 3 years old, the occasional visitor would notice new language abilities and forms of play, suggesting that the child had entered a new stage of development.

developmental domains Specific areas of ability or experience, such as cognition, language, memory, relationships, or emotion.

stagewise Characterization of development as occurring in distinct phases, with qualitative differences between stages.

Parents, or observers who see the child frequently, would be aware of the many subtle changes from birth to the time when independent crawling or walking began. They would know that new abilities did not emerge all at once, but were the result of days, weeks, or even months of practice and, initially, failure. Seen in this way, development is relatively **continuous**, without clearly marked stages.

Theories differ in terms of whether they describe development as mainly stagewise or primarily continuous. Researchers' beliefs about how development occurs may influence the measures and designs they use in their studies and the inferences they draw from their data.

Heredity and the Environment

In every domain of development, there has been debate about whether the amazing transformations during the first three years of life are the result of childrearing practices and experiences in the environment (**nurture**) or whether they occur relatively independently of experience (**nature**) and are the result of some predetermined "program." Researchers have moved away from the strong version of this debate, and no one would plausibly argue today that development is affected only by experiences parents provide. Nor would anyone seriously assert that parents' contributions are unimportant in children's development. Instead, the debate has become more nuanced, with both sides recognizing that there is an interaction of heredity and the environment (Spencer et al., 2009; Steinbeis, Crone, Blakemore, & Kadosh, 2017).

This does not mean that the nurture camp has ceased exploring the effects of experience; indeed, it has become even clearer that there are many coexisting, interacting environmental influences in children's lives. Children are influenced by environment in both direct and indirect ways, including settings in which they never spend time, such as their parents' workplace (Lawson et al., 2016). Parents who have stressful jobs, for example, may be more impatient and less sensitive interacting with their children at home than parents whose work is less emotionally draining. The quality of the care that infants receive is also affected by the wider neighborhood or community in which they live as well as the cultural context and even the historical period (Bronfenbrenner & Morris, 1998; Ramey, Ramey, & Lanzi, 2006).

The nature proponents, for their part, have also continued to provide new levels of analysis. Studies of prenatal development, aided by high-tech tools, enable researchers to view the developing fetus with increasing clarity and precision. Early twentieth-century notions about the brain's development during infancy have been expanded and modified as well by recent advances in neuroscience.

Researchers know more than ever before about the genetic material that provides a "blueprint" for development.

The evidence is also clear, however, that even some aspects of development that appear to be "prewired" are influenced by experience. This concept, known as **epigenesis**, refers to the interaction of genes with each other and with the organism's internal

continuous Characterization of development as a gradual, smooth process of change.

nature Biological factors influencing development.

nurture Environmental and experiential factors influencing development.

epigenesis The interaction of genes with each other and with the organism's internal and external environment to produce developmental outcomes, such as new structures, behaviors, and abilities.

From birth, babies are prepared to respond to and elicit responses from parents and other caregivers.

and external environment to produce developmental outcomes, such as new structures, behaviors, and abilities. It was first described in the 1940s by the embryologist and geneticist Conrad Waddington and subsequently incorporated into theories developed by Konrad Lorenz and others (Lickliter, 2013). Epigenetic theories are more prevalent than ever, and contemporary researchers note that "[t]he building of brains, bodies, and flexibility involves a cascading developmental process in which genes and their products interact within their local environment to create the substrates for further development" (Spencer et al., 2009, p. 104). Dietary regulation, for example, can alter the effects of a genetic predisposition for the disease phenylketonuria (PKU), preventing cognitive disabilities that would occur otherwise. Exposure to alcohol during the prenatal period, as another example, can anesthetize the fetus, interfering with the movement of arms and legs and changing the normal course of the brain's development and later functioning. Children's biologically influenced characteristics, such as whether they are "easy" or "difficult" babies, also have an impact on the responses they elicit from parents and other caregivers. Despite their shared genes, identical twins exhibit different amounts of positive and negative social behaviors toward other children and adults if their parents consistently show more affection to one twin but are hostile and punitive toward the other child. As these examples and others throughout this book confirm, it is clear that development occurs as a result of the interaction of both nature *and* nurture.

Active or Passive Development?

Throughout history, parents, philosophers, social reformers, and scientists have tended to view infants as relatively incompetent, passive creatures, playing a minimal role in their own development. The childrearing advice given to parents tended to reflect this perspective, and parents were seen as the most important agents in their child's early education, socialization, physical development, and personality formation.

Babies are prepared to respond to and elicit responses from parents and other caregivers from birth, however. Even very young infants are capable of communicating many of their needs nonverbally by cooing, crying, and reaching. They also learn about the physical world as they explore it using different methods at different ages, first mouthing objects and later fingering, grasping, banging, and dropping them. Contemporary theories of infant development incorporate infants' surprisingly sophisticated capabilities, and many empirical studies measure changes that result from infants' own actions as well as the actions of their caregivers.

Normal and Atypical Development

It is also clear that infants develop at different rates. Parents whose babies develop earlier than other children—rolling over, sitting up, or walking first—may feel a sense of pride, even when the milestone is something over which they have no direct influence, such as the eruption of the child's first tooth. It can be worrisome, though, if the baby seems significantly slower to develop than other babies. Infants with atypical development, whether in the physical, cognitive, or socio-emotional domain, may present a challenge to parents and caregivers, but they also can and should be included in activities and programs with more typically developing children.

Culture and Context

There are both similarities and differences in the ways that parents care for and interact with infants. In some cultures, in contrast to typical arrangements in the United States, infants and parents share the same bed, even when there would be room in the house for children to sleep elsewhere by themselves. In addition, although many US parents play games and engage in pretend play with their infants and toddlers, these practices are not universal. Throughout this book, beginning in this introduction, you will learn about some of these differences and what they reveal about the nature—and nurture—of early development.

The richness and diversity of parenting practices within the United States existed long before European immigrants arrived in the New World. Across the numerous and diverse Native American cultures, daily family life and customs involving marriage, birth, and childrearing reflected worldviews that prevailed in each culture and geographical region. In some groups, each nuclear family functioned as a separate unit and lived in its own dwelling, but in others, households consisted of several nuclear families sharing a common long house. In many Native American cultures, elaborate ceremonies involving members of the community were performed at the birth of a child, and other adults in the community were often responsible for guiding and supporting the child at significant milestones in life, practices that remain important today (Gill, 2002).

The diversity and validity of Native American family life has not always been recognized or supported in the United States.

The diversity and validity of Native American family life has not always been recognized or supported. For much of US history, American Indians were encouraged or coerced to follow European patterns of childrearing, and differences among tribes were either dismissed or not recognized. It was not until 1978, when the Indian Child Welfare Act was passed, that the intrinsic value of American Indian cultures and extended families was recognized at the federal level. Although there are still concerns about interpretation and implementation,

the law has resulted in fewer children being removed from their families, a practice that had occurred in the past for as many as 25 to 35 percent of all American Indian children (Goodluck, 1999).

A history of family disruption is also part of the experience of many African Americans, a phenomenon that can be traced back to the practice of slavery. However, there were also African Americans who were free while others were enslaved, and it is important to recognize differences in past experience as well as the great diversity in family structure and parenting style that exists among contemporary African American families (Hatchett & Jackson, 1999; McAdoo, 1999).

Similarly, whereas some Mexican American families and families of Spanish descent have been in the United States since the eighteenth and nineteenth centuries, there are also many who immigrated during the second half of the twentieth century or, more recently, from Mexico, Puerto Rico, the Caribbean, and Central and South America (McAdoo, 1999). Researchers have shown that there are many different parenting styles among these groups (Chahin, Villarruel, & Viramontez, 1999; Martinez, 1999; Suárez, 1999).

Great diversity of experience, beliefs, and behaviors are also found among families who are often grouped together as Asian American. Chinese immigrants, for example, began arriving in the United States in 1820 but were actively prevented from coming to and being integrated into the United States after 1882, when the Chinese Exclusion Act was passed (Lin & Liu, 1999; Ou & McAdoo, 1999). Vietnamese families, by contrast, largely immigrated to the United States in three distinct waves during the 1970s and 1980s (Gold, 1999).

Refugees from unstable countries, such as Somalia and Sudan, have found new homes in the United States and in other countries, often in communities that bear little resemblance to the villages and cities from which they came. Differences in family structure, social class, and educational background prior to immigration, as well as differences in community sponsorship and support, have had a significant impact on each of these groups' experience.

In summary, the United States is becoming a more diverse nation in an increasingly interconnected world. Awareness of cultural and ethnic diversity is essential for understanding the many different settings in which infants develop. In addition to culture, ideas about proper childrearing practices are often a function of historical context, as discussed next.

HISTORICAL PERSPECTIVES ON INFANCY AND EARLY CHILDHOOD

In the past, like today, there was not always agreement about the proper care of infants and the role of children in society. From the vantage point of the mid-twentieth century, for example, some historians (Ariès, 1962) painted a picture of earlier times as a freer, more equitable era for children. According to this perspective, children's lives may have been better before adults removed them from the

working world and sequestered them in school for years of compulsory education. This nostalgic interpretation was challenged, however, by historical research showing that children in the past were more likely to be killed, abandoned, exploited, and abused (Boswell, 1988; Clement, 1997; Hawes & Hiner, 1985).

literary evidence Written information, including parents' diaries and letters, childrearing advice written by ministers and doctors, and children's books.

quantitative archival evidence Official sources of written information and data, including census data, tax records, and legislative and court records.

material culture Physical evidence, such as toys, clothing, furniture, and works of art.

Historical Studies of Children and Childhood

Examining the evidence (described in Box 1.1), some historians of childhood have concluded that, despite social and technological changes, there is significant continuity and surprisingly little change in parent–child relationships over the years 1500 to 1900. According to some historians, for example, far from tolerating or ignoring child abuse and abandonment, in the past most parents, and society as a whole, looked at these practices with horror and outrage, much as parents and other adults do today. There is also

BOX 1.1 | Studying Children and Childhood with a Historical Lens

Given that parents and children who lived long ago cannot be observed or interviewed, how do historians know what their lives were like and what adults of the time thought about them? Three major sources of information are available: (1) **literary evidence**, including parents' diaries and letters, childrearing advice written by midwives, ministers, and doctors, and children's books; (2) **quantitative archival evidence**, such as census data, tax records, and legislative and court records; and (3) **material culture**, such as toys, clothing, furniture, and works of art.

When interpreting these sources, historians note that many of the details about daily life probably were not recorded because they were viewed as ordinary and unimportant. It is also possible that diaries included entries about problems that parents encountered with their infants, rather than successes, leading modern readers to assume that there were more problems than successes (Pollack, 1983). Where records do exist, they generally represent families who were educated, wealthy, or socially prominent. Another limitation is that beliefs and behavior do not always match; as is true today, even when parents possessed childrearing manuals, it cannot be assumed that they followed the advice they contained (Colón & Colón, 2001; Hulbert, 2003; Pollack, 1983; Schulz, 1985).

Questions

1. What kinds of evidence can be used to study children and families who lived long ago?
2. What are some limitations of using historical evidence to understand children and families in the past? What are some advantages of using this kind of evidence?
3. Imagine that you are a historian in the twenty-*second* century, and your topic is the history of infancy and early childhood. What sorts of literary evidence, quantitative evidence, and material culture—evidence and artifacts being created today—might you use to study parenting in the twenty-first century? What sorts of conclusions might be drawn from these sources about our current society's attitudes about infants and their development? What would be the advantages and disadvantages of using these kinds of materials instead of observing infants directly?

evidence that parents who sent their infants to wet nurses were emotionally attached to them and took steps to remove their children from these arrangements if they discovered conditions of neglect or abuse (Pollack, 1983).

There is also compelling evidence that parents have always wondered about their children's development, even before birth, and have taken steps to promote their well-being. Views about proper childrearing methods and even definitions of childhood itself have often changed, however. This is because they are cultural inventions and constructions that reflect a society's basic shared beliefs and values at a particular point in time (Borstelmann, 1983; Cahan, Mechling, Sutton-Smith, & White, 1993; Colón & Colón, 2001; Hulbert, 2003). The impermanence of childrearing beliefs and practices is reflected in a significant reversal that occurred by the nineteenth century in Paris; wealthy women began nursing their own infants, and poorer mothers who worked outside of the home were the ones hiring wet nurses (Colón & Colón, 2001).

The next two sections summarize changing views of children and family life. Although some aspects of childhood in ancient Greece and Rome, as well as medieval and Renaissance Europe, are briefly considered, the main focus is on the United States and the time from the nineteenth century to the present.

Views of Children

At many points in history, some parents and other adults have regarded children as innocent, naïve, and unformed, whereas others have viewed them as possessing innate, sometimes undesirable, characteristics and predispositions that need to be modified through parents' actions. Views of children at any given time influence the systems and policies in place to protect children and promote their development.

Stages of growth and development were noted in ancient times, and distinctions were made between infants, young children, and adolescents. Children in ancient Greece and Rome were valued as the future of society but generally regarded as property with few rights (Borstelmann, 1983). Boys were valued as future warriors, and infant males were inspected to be sure that they were sufficiently healthy to benefit from rigorous training and education. Infants who did not pass this inspection were abandoned and left to die of exposure (Colón & Colón, 2001).

Early Roman law required parents to raise all healthy male infants and at least one of the female infants born to them. Infants were abandoned for a number of reasons, including gender, poverty, illegitimacy, and birth defects (Boswell, 1988). Infanticide and maltreatment of infants and young children were practiced for many years before Roman emperors, beginning around the year 100 CE, acted to protect children through legal reforms (Colón & Colón, 2001).

In medieval Europe (approximately 500 to 1300 CE), plagues killed many people, and fewer written records remain than from ancient Greece and Rome (Boswell, 1988). According to the documents that

did survive this era, **infant mortality rates** (the number of deaths per 1,000 live births, before the age of 1 year) were high, and perhaps as many as one or two of every three children died in the first year of life. Parents used charms of various kinds to protect their infants from harm and sickness (Fontanel & d'Harcourt, 1997). One of the "ailments" that parents feared during the Middle Ages (and well into the mid-nineteenth century) was teething. Infants who were teething often suffered from fevers, convulsions, and diarrhea brought on by parasites, cholera, or respiratory diseases, so many parents erroneously believed that teething per se could prove fatal. Remedies for teething and its accompanying illnesses included placing leeches on the baby's gums, hanging charms around the baby's neck, or following other superstitious practices that were thought to transfer the baby's ailment to some other person or object (Fontanel & d'Harcourt, 1997; Howe, 1998).

Parents whose infants became ill often went on a religious pilgrimage or prayed to the "first pediatricians of Christianity"—saints specializing in children and their illnesses, including Saint Quintin (whooping cough), Saint Blaise (sore throats), Saint Apollonia (toothaches), Saint Nicholas (colic and diarrhea), and Saint Medard (parasitic worms) (Boswell, 1988; Fontanel & d'Harcourt, 1997).

In early medieval Europe, infants were abandoned and left to die of exposure. Parents had the legal right to sell their children into servitude. Among some poor families, the practice of infant abandonment declined when opportunities developed for impoverished children to earn a living by becoming servants in the households of wealthy families (Boswell, 1988).

In some wealthy families, infant abandonment functioned as a way of reducing the number of possible heirs among whom the father's property and wealth would need to be divided. Changes in inheritance laws in some parts of Europe, such as England, allowed a single heir to be designated, resulting in a reduction in infant abandonment (Borstelmann, 1983).

During the Renaissance (approximately 1300–1500), as in previous times, children were abandoned and left at the doors of churches or in publicly run foundling homes. These institutions, which were the precursor to orphanages and children's hospitals, developed systems through which mothers could anonymously leave newborns. In some cases, there was a depository with a revolving tray on which the infant could be placed and transferred indoors (Boswell, 1988; Colón & Colón, 2001; Fontanel & d'Harcourt, 1997). Sadly, infants taken into these foundling homes may have been more likely to die than infants who were taken in by adoptive parents. Records from the fourteenth century show that, as a result of poor hygiene and an absence of effective medical care, 20% to 40% of infants died within a year, many within a month, of arriving in the foundling home. By comparison, the mortality rate among infants sent to wet nurses during the same time was about 17 percent (Boswell, 1988).

Many Renaissance thinkers contemplated ways to create a perfect society, as exemplified by Sir Thomas More's *Utopia* (1516). More's book pondered human values, the difference between good and evil,

infant mortality rate
Number of deaths per 1,000 live births, usually reported with reference to the age of 1 year.

and the path to virtue. The ideal child was described as pious, disciplined, obedient, and teachable. The debate about whether infants were inherently innocent or corrupt continued in Europe and was exported to Puritan colonies that were established in the New World by the middle of the seventeenth century.

For Puritans in Colonial America, infants were believed to be conceived in sin, and prenatal care was both physical and spiritual (Beales, 1985). Parents had two main responsibilities, instruction and discipline, reflected in advice from John Robinson, minister of the Plymouth Colony (1625), who wrote, "[T]here is in all children, though not alike a stubbornness, and stoutness of mind arising from natural pride, which must, in the first place be broken and beaten down" (cited in Moran & Vinovskis, 1985, p. 26).

Despite the harshness of these words to our twenty-first-century ears, there is evidence that Puritan parents were devoted to their children. Parents showed love and concern for their infants' souls by baptizing them early, usually within one to two weeks of their birth. Other signs of parents' love include expressions of grief in letters and diaries after a child had died. The care and training of children were the nuclear family's responsibility, but concerns about spoiling them with too much affection led some parents to send their offspring to live with other families for a time (Beales, 1985; Hareven, 2000; Pollack, 1983).

Throughout the colonial period, epidemics of smallpox, diphtheria, scarlet fever, yellow fever, intestinal diseases, and influenza occurred in waves. Smallpox was particularly deadly, especially for young children; although it was controversial, some parents inoculated their children against the disease after the practice was introduced in Boston in 1721. Children also died of ordinary childhood diseases, including measles, whooping cough, and mumps. In addition, because homes were not "baby-proofed," many young children died or were seriously injured in accidents. Slave children often suffered from malnutrition and lacked adequate sanitation, shelter, clothing, and adult supervision, contributing to a mortality rate for young black children that was twice that of white children (Colón & Colón, 2001; Schulz, 1985; Schwartz, 2016).

Unlike the Parisian parents described at the beginning of this chapter, Puritan mothers nursed their infants themselves, a practice that was thought to impart the mother's positive qualities and pious attitudes to the child early on (Finkelstein, 1985). Coincidentally and fortuitously, antibodies in the mother's milk also afforded infants at least some degree of temporary immunity from the diseases surrounding them (Beales, 1985).

As waves of new immigrants arrived in the United States and settled in urban areas with large populations, members of the clergy, educators, and social observers became concerned about the children. Disease and illness, including cholera, tuberculosis, and infant diarrhea, were rampant; hunger and malnutrition were common (Berrol, 1985). In response to these conditions, from 1800 until 1835, clergy members established protective settings, such as Sunday schools for infants in the factories where their parents worked (Finkelstein, 1985).

During the nineteenth century, an increasingly romantic view of childhood emerged, and young children were seen as the redeemers of a more complex, possibly corrupt, industrialized society (Borstelmann, 1983). In a sense, childhood was discovered anew. The home was viewed as a refuge from the outside world (Hareven, 1985, 2000), and the mother's role as moral guardian was sentimentalized and emphasized in numerous publications.

Infants and very young children were thought to need "guidance, not repression, activity rather than confinement, sensitive tutoring from a totally available, benevolent mentor" (Finkelstein, 1985, p. 124). Because mothers were viewed as inherently gentle and morally superior, they were seen by many as the ideal agents to protect children through a concentrated, socially isolated relationship in an environment that they controlled (Finkelstein, 1985).

The sentimentality directed toward motherhood began to change toward the end of the nineteenth century, as scientific professionals emerged to assist mothers in making good choices for their children. Mothers' clubs and child study groups were formed across the country. The National Congress of Mothers was founded in 1897, as "the widespread mood of a closing century coalesced into a self-conscious institutionalized movement for a new era" (Hulbert, 1999, p. 21). At the 1899 National Congress of Mothers, Dr. Luther Emmett Holt, one of America's first pediatricians and author of *The Care and Feeding of Children* (1894), reflected this mood when he endorsed systematic, scientific study as the best way to promote children's health and development (Hulbert, 1999).

Holt's advice found a receptive audience because scientific study had shown that bacteria in urban milk supplies were the likely source of fatal infections and diseases in infants. To address this problem, child-health activists established milk stations, first in New York City during the 1890s, and later in other US cities. As milk stations became more widespread, advice about infant care, feeding, and hygiene was dispensed along with the milk (Colón & Colón, 2001; Halpern, 1988).

Beginning in the 1890s, advice about infant care, feeding, and hygiene was dispensed to immigrant parents in locations that included New York City's Ellis Island.

Another sign of concern for child welfare at the end of the nineteenth century was the emergence of the Progressive Movement, which was active from the 1890s until the 1920s. Progressives were motivated by a mixture of feelings—humanitarian altruism, concern, fear, confusion, and a desire to exert control over the changing urban environment (Cohen, 1985). Members of the Progressive movement established private and public institutions, all of which existed to counteract the negative influence of the adult world on children (Finkelstein, 1985).

Public policy and interventions addressing the problems of children and families became established during the twentieth century, and many are now a familiar part of twenty-first-century life. Women's organizations organized child study initiatives to

document and solve child welfare problems. They also lobbied for federal support of studies of children's health and development. In 1912, the United States Children's Bureau was established to serve as a clearinghouse for information about the best childrearing practices and published *Infant Care*, a manual distributed at no cost to millions of new parents (Cohen, 1985; Cravens, 1985). The federal government lacked the funds to produce significant change, however. In the end, philanthropic foundations partnered with universities to support the scientific study of children and their development (Cravens, 1985).

Family Life

European immigrants to the New World in the early seventeenth century brought their old customs, beliefs, and childrearing practices with them. It is difficult to generalize about their experience in the American colonies because, like today, childhood and family life were affected by the characteristics of the local community (Beales, 1985; Schulz, 1985). The best records of colonial families come from Puritans who settled in New England.

In the seventeenth century, most New England women married in their late teens or early twenties. Childbearing usually began within the first year of marriage and continued for most women, at two-year intervals, until they were in their late 30s or early 40s (Beales, 1985). Families thus had a relatively large number of children, by today's standards, but the high rate of infant mortality (between 10% and 30% of infants did not survive beyond the age of 1 year) meant that the household itself was not necessarily that large at all times (Schulz, 1985). The basic family unit was the nuclear family, with kinship networks nearby (Hareven, 1985, 2000).

For the children of slaves, family life was significantly different. In addition to the widespread lack of adequate food, shelter, medical care, and adult supervision, children born into slavery suffered from disruptions to the family unit, including being separated from parents and siblings (Schwartz, 2016). Slavery in the United States was outlawed in 1865, when the Thirteenth Amendment was ratified, but the impact of this history continues to the present time (Hill, 2016).

Beginning in approximately 1800, the Industrial Revolution changed many aspects of family life dramatically. At the beginning of this period, most children lived in rural areas and grew up farming with their parents and a relatively large number of siblings (in 1865, 82% of families had five or more children). By the mid-twentieth century, by contrast, most children had fewer siblings (in 1930, 57% lived in families with three or fewer children) and lived in urban areas with populations of 10,000 or more (Hernandez, 1997). An equally significant shift began immediately after the Civil War ended, when approximately 6 million emancipated slaves began migrating from the rural South to cities in the North (Berlin, 2010; Goodin, 2014; Rutkoff & Scott, 2010). A second Great Migration occurred between approximately 1940 and 1970 (Boehm, 2009).

The Great Depression of the 1930s had a significant impact on family life. In general, children born during the years of greatest economic hardship were more negatively affected than children whose first years of life occurred when their families were more affluent (Elder, 1974; Elder & Hareven, 1993). This finding reflects the unique vulnerability of infants and toddlers (Evans, 2004).

A defining demographic trend—the Baby Boom—occurred in the years following World War II (1946–1964). Babies born at this time entered a new child-centered period of prosperity. There was an increase in the proportion of Americans marrying and a decline in the number of childless couples. The average age at which women married decreased from 21.5 in 1940 to 20.1 in 1956 (Strickland & Ambrose, 1985). For comparison, the corresponding age was 27.8 in 2015 (US Census Bureau, 2015). More couples were having their first child within 13 months of their marriage, and more than half of women marrying for the first time gave birth to their first child before they were 20 (Strickland & Ambrose, 1985).

In the 1950s, middle-class parents, especially young, first-time mothers, regarded their role in ways that were different from prewar parents. Many parents were influenced by Dr. Benjamin Spock's (1946) *The Common Sense Book of Baby and Child Care*, which sold more than 28 million copies and by 1976 had become the best-selling book in the twentieth century, after the Bible. Spock urged parents to adopt a child-centered, "commonsense" approach for socializing children, minimizing confrontation and conflict in the family. He encouraged mothers to monitor their children's growth and development and to gently and tactfully guide them toward becoming a cooperative member of a happy family (Strickland & Ambrose, 1985). Spock's goals also included alleviating mothers' anxiety about childrearing, since he believed that anxiety itself could be harmful to children's development. Ultimately, the book was intended to help parents create a more democratic society (Hulbert, 2003; Strickland & Ambrose, 1985). As shown in Table 1.1, Spock's advice about toilet training also reflected attitude changes in the 1940s (Brazelton et al., 1999).

Not all families were aware of the new, child-centered approach. One study from the 1960s compared white and black mothers in Chicago in terms of their exposure to Spock's book. Whereas 77 percent of white, middle-class mothers had read *Baby and Child Care*, only 32 percent of black, middle-class mothers had. Similar patterns were found among working-class mothers, with 48 percent of white, working-class mothers reporting that they had read Spock's book as compared to 12 percent of black, working-class mothers (Blau, 1971, cited in Strickland & Ambrose, 1985).

In the 1960s, the public became more aware of the harm being done to children growing up in transience, poverty, and poor living conditions.

TABLE 1.1 | Changes in Attitudes and Advice about Toilet Training

Years	Attitudes and Advice
1920s–1930s	A rigid, parent-centered approach to toilet training was recommended. This view was in keeping with the theoretical positions of well-known child development experts, such as John B. Watson.
1940s–1950s	Experts, including Benjamin Spock, rejected absolute and rigid rules for toilet training. It was believed that rushing children or being too harsh with them might fail and lead to behavioral problems. Parents were advised to look for "signs of readiness" in their child and to communicate with them in order to enlist their cooperation before beginning training.
1950s–1960s	Pediatricians, such as T. Berry Brazelton, proposed a child-oriented gradual method. Based on notions of child readiness, this approach integrated physical, emotional, and cognitive elements. Child readiness was believed to be present in most children by the age of about 18 months. Surveys from 1951 to 1961 showed that approximately one-half of children were continent during the day by the age of 27 months, and nearly all children (98 percent) were fully toilet trained by the age of 36 months.
1960s–1970s	Experts, such as Nathan Azrin and Richard Foxx, used applied behavior analysis as the basis for structured-behavioral toilet training. In published reports, their method was said to achieve toilet training with normal, healthy toddlers in an average of 3.9 hours. The Azrin-Foxx method incorporated notions of child readiness with principles of applied behavior analysis.

Source: Brazelton, Christophersen, Frauman, Gorski, Poole, et al. (1999).

Other groups, such as migrant worker families, did not benefit from postwar prosperity. A landmark television documentary in 1960, *Harvest of Shame*, showed that migrant children often began working in the fields by age 7 or 8 and experienced transience, poverty, and poor living conditions from birth. Middle-class Americans who saw this program were shocked to learn that only 1 out of every 500 migrant children finished grade school (Strickland & Ambrose, 1985).

There was growing public awareness that not all US children were being nurtured by parents with the knowledge, skills, and time to implement the new approach to childrearing. There was increasing evidence of the harm being done to children growing up in environments filled with poverty, discrimination, and a lack of opportunity or hope. This awareness led to political support for a "war on poverty," an effort to create a "Great Society" in the United States, eliminating poverty and racial injustice. Project Head Start was created in 1964 to serve preschool-age children of low-income families.

The compensatory model of Head Start sought to provide the best childrearing advice and comprehensive services for economically disadvantaged families. A review of the US Children's Bureau *Infant Care* manual and *Parents* magazine from 1955 through 1984 showed

that there was not a simple, direct relationship, however, between what experts knew and the information that was communicated to parents. Biological aspects of infant development (perception, cognition, and temperament) were most accurately and consistently presented, but coverage of the mother–infant relationship, childcare, feeding, and fathers grew, shrank, or remained the same as a function of the "broader cultural context and demographic changes" (Young, 1990, p. 17).

As shown in Table 1.2, advice about the mother–infant relationship from the mid-1950s until the early 1970s emphasized the

TABLE 1.2 | What Child Development Experts Told Parents (Usually Mothers) in *Infant Care*

Topic	1955	1980
Newborns . . .	are more passive than active.	learn through their own actions, but parents need to provide stimulation.
Temperament . . .	for each baby is different.	refers to your baby's distinctive style. Which type is your baby?
Feeding . . .	your baby with breast milk is the natural way. The breast is the center of the baby's emotional world.	with sensitivity is more important than whether you give your baby breast milk or formula. Unless you feel strongly about not breastfeeding, however, you should plan to nurse your baby.
The mother–infant . . .	relationship is the reason your baby is happy and secure. Your baby needs you as much as he or she needs food or air.	is only one of several important relationship influences on your baby's emotional health.
The father . . .	can be a great help to you, but do not expect your baby's father to share equally in caring for him or her.	provides a unique and necessary complementary relationship to the relationship that you have with your baby. Your baby's father can share the role of primary caregiver with you.
Nonparental childcare . . .	is like boarding your baby away from home.	will not harm your baby as long as you choose the right setting. Use our checklist to judge your baby's childcare setting.
Infants . . .	are able to see light and color. They have an awakening memory around the age of 6 months.	are able to track objects, make associations between events, and discriminate patterns. They learn best when you interact with them and respond to their actions. Watch to see what your baby is interested in and take your cue from him or her.

Source: Young (1990).

mother's role over all other influences; by the 1970s, experts recognized that the mother–infant relationship is only one of many important relationships influencing the child's development. Advice about the father's role revealed another shift, from the 1950s and 1960s, when "mothers were encouraged to include fathers in the care of the baby but not to expect fathers to share equally in the care of the infant," to the mid-1980s, when "new parents were told that fathers could share in the role of primary caretaker" (Young, 1990, p. 23).

The trends that produced the Baby Boom generation were not duplicated by young adults in the later 1960s and 1970s. The average age for first marriage increased steadily, and many young adults postponed having children or even decided to remain childless. Marriage and parenthood came to be viewed as a personal choice and less as a "natural" accompaniment of adulthood. Social regard for families remained high, but there was more tolerance of a range of choices about whether and when to start a family (Arnett, 2000; Douvan, 1985).

Views of childhood have evolved throughout history, and there is little debate today about whether children are inherently innocent or sinful. In fact, "the transition from a moral and religious to a more secular and scientific view of childhood is one of the great revolutions" of the twentieth century (Smuts & Hagen, 1985, p. 6). The fascinating transition to the scientific study of infants and children is the focus of the next section.

THE DEVELOPMENT OF CHILD DEVELOPMENT

During the twentieth century, parents increasingly turned to professionals with expertise in the field of child development to provide guidance and answer questions about childrearing. To understand the history of the scientific study of infants and children requires some understanding of the emergence of child development and its introduction into the United States at the beginning of the twentieth century, as well as an awareness of the emergence of pediatric medicine, because many researchers in child development focused their attention on early physical growth and motor development.

The current practice of parents bringing their infants and children to visit a pediatrician, not only in times of sickness but also for preventive well-child care, is an experience that most children growing up in previous eras would not have had. Parents sought advice from local experts, such as midwives, clergy, and older relatives, but physicians who focused exclusively on children did not exist. In 1880, child specialists called themselves *pediatrists* rather than pediatricians, and there were fewer than 50 such specialists in the United States, none of whom saw children on a full-time basis. It was not until the 1930s and 1940s that pediatrics emerged as a secure, established part of medicine (Cravens, 1985; Halpern, 1988).

Pediatrics developed in response to health-related social problems, such as those affecting the children of immigrants (Halpern, 1988; Sears, 1975). The same influence of real-world problems was evident

in the origins of helping professions such as education and social work and, to a great extent, in the discipline of child development.

In the final section of this chapter, you will learn about several key figures in the history of child development and their contributions to the scientific study of children in the United States.

G. Stanley Hall

Scientific approaches to the study of child development were introduced into the United States by G. Stanley Hall, the first professor of psychology in the United States, the first president of the American Psychological Association, and an organizer of the Child Study Section of the National Education Association. Hall became aware of child psychology during post-doctoral studies in Germany with Wilhelm Wundt (who established the first psychology laboratory in 1879) (Cravens, 1985). Returning to the United States in 1880, Hall was convinced that the new science of psychology had the potential to create better individuals and thus a better society (Hulbert, 1999). He believed that scientific research and the study of children could transform educational practices (Cairns, 1998). Among his contributions are the following:

- Using a questionnaire method to study children's thinking and to help teachers understand the concepts children had learned by the time they entered school.
- Appearing with Dr. Luther Emmett Holt (discussed earlier in this chapter) to give speeches at meetings of child study groups.
- Training many of the first child psychologists in America, including John Dewey, one of the most influential psychologists in the field of education in the early twentieth century.
- Arranging a historic meeting in 1909 between Sigmund Freud and leading psychologists in North America to discuss Freud's views that experiences early in life, especially infancy and toddlerhood, are of great consequence for subsequent development and functioning.

James Mark Baldwin

James Mark Baldwin founded an experimental laboratory at the University of Toronto, in which he began a research program on infant psychology (Cairns, 1998). Among the topics Baldwin explored in the early 1890s were the development of movement patterns and handedness. In one study, Baldwin observed the development of his infant daughter's reaching behavior under systematic, controlled laboratory conditions. To eliminate any hand preference that might result from the way that parents carry their infants, Baldwin and his wife gave their daughter equal time in their left and right arms (Harris, 1985). Influenced by theories of evolution, Baldwin considered research on "handedness" in animals to be relevant to his study of human infants. Baldwin is also remembered for:

- Asserting, in 1895, that intellectual development in the individual could not be considered without also contemplating the evolution of the mind in the human species.

- Describing how development progresses from infancy to adulthood in a series of stages, the first of which he called the sensorimotor stage, a term later used by Jean Piaget in his theory of infant intelligence.
- Articulating, in 1897, the view that social development begins in infancy and occurs through a process in which the child moves from an initial, self-focused stage and eventually reaches a more empathic stage that incorporates the views of other people. This sociocultural approach appeared years later in the work of Russian psychologist Lev Vygotsky (Wertsch & Tulviste, 1992).

John B. Watson

As the United States became a major center for the scientific study of children, the public became more aware of the implications and applications of this new science in their homes, schools, and communities. In contrast to G. Stanley Hall's enthusiasm for European traditions in psychology, John B. Watson carried out research at Johns Hopkins University from 1916 until 1920 and wrote books about the "purely American" psychological perspective of behaviorism. He gained recognition in the 1920s and 1930s for popular-press publications advising parents to apply behaviorist theory to childrearing. Here are some of the reasons Watson remains a well-known figure:

- Watson rejected European traditions, including questionnaire research and the use of introspection (self-reflection) as a way of tapping the contents of the mind. In his view, the only way to produce scientific data was by observing behavior.
- Watson observed infants, studying their behavioral and emotional responses to stimuli that he presented. Watson chose to study infants because he believed that the conditioning of basic emotions (love, fear, and rage) early in life provided the foundation for later behavior and personality.
- Watson believed that psychological science should be applied across a wide range of everyday settings, including the home. In a best-selling book, *Psychological Care of Infant and Child* (1928), Watson argued that parents, especially mothers, should avoid smothering their children with too much affection. The danger, he wrote, was that the child would become conditioned by this love, the result being an unhealthy dependence on and need for attention and affection from others. Watson urged parents to be emotionally cool with their children and to adhere to strict schedules.

The empirical study for which Watson is probably best known is a case study of conditioned fear in an infant he referred to as "little Albert" (Watson & Rayner, 1920). Watson paired the presentation of an aversive stimulus (a loud noise that made Albert fearful and upset) with a previously neutral stimulus (a white rat). Following a series of pairings, the rat alone began to elicit a fear response from the child, supporting Watson's behaviorist prediction. Although

the details of Watson's ethically questionable experiment have been embellished and even distorted over the years (Harris, 1979), it influenced subsequent psychological studies in the 1920s and 1930s and is often part of the standard coverage of behaviorism in many psychology courses today.

Arnold Gesell

Arnold Gesell, a former student of Hall, founded a child study laboratory at Yale in 1911, in which he carried out methodologically rigorous and innovative studies of early physical growth and motor development. Gesell concluded that infants have an innate ability to develop in optimal ways, despite variability in experience. Gesell's accomplishments include

- Being one of the first to compare the development of twins and to use filmed observations of children in his research.
- Publishing the results of his research in 1928, in *Infancy and Human Growth*, a book in which he charted and compared normal and "exceptional" infants in terms of their physical, motor, and perceptual development.
- Recognizing a key role for maturation in development while also noting that experience may modify the functioning of some inborn maturational mechanisms.

Child Research Institutes: Research and Dissemination

Child research institutes, including those at Columbia University, Yale University, and universities in Iowa and Minnesota, were established in the 1920s and 1930s with funds provided by the Laura Spelman Rockefeller Memorial (Schlossman, 1985). The dual mission of these institutes was research and dissemination of useful findings to the general public, documenting the growth and development of "normal" children, as described in Box 1.2.

A significant amount of research and theoretical work in child development during this time was influenced by Freud's (1910) psychoanalytic theory (Emde, 1992). Social learning theory emerged as a hybrid of behaviorist and psychoanalytic thinking, and researchers applied concepts such as reinforcement, imitation, and observational learning to problems like childhood aggression, usually focusing on school-age children.

Following the Depression (1930–1945), federal agencies were established and legislation was enacted to address child welfare problems, especially those resulting from economic devastation. In addition to child labor laws, federal daycare programs were established in the 1930s through the Works Progress Administration; the 1935 Social Security Act offered coverage for dependent, rural, and disabled children; and free lunches were offered daily to poor children in New York City (Ashby, 1985).

BOX 1.2 | Sharing the Results

Interest in scientifically derived information about parenting and child development continued to grow throughout the twentieth century. *Parents Magazine* began publishing in the late 1920s, initially affiliated with the Laura Spelman Rockefeller Memorial and the child development research institutes (Schlossman, 1985).

A scholarly scientific journal, *Child Development*, was established in 1930. Soon after that, the Laura Spelman Rockefeller Memorial and the National Research Council launched the Society for Research in Child Development (SRCD)—the interdisciplinary professional organization that became associated with *Child Development* (Cravens, 1985). The Memorial also funded programs to recruit future professionals and to develop parent education programs.

Today, SRCD is a multidisciplinary professional association with more than 5,500 members engaged in research, education, policy making, and practice in more than 50 countries (The Roots of SRCD, 2017). An Oral History Project begun in the late 1980s documented these events, as seen through the eyes of those who participated in them as child development researchers and practitioners (Cameron & Hagen, 2005). Results of this project—more than 115 interviews and scholarly profiles—are archived on the SRCD website. In 2012, SRCD joined with other professional organizations to establish the International Consortium of Developmental Science Societies, dedicated to using developmental science to understand global challenges and improve lives through research, policy, and practice.

Questions

1. How were the results of child development research shared when the field was still in its infancy? What was the purpose of creating two different types of publications, *Parents Magazine* and the journal *Child Development*?
2. Why was the Society for Research in Child Development established? What is the value of an organization like SRCD?
3. What is being done to preserve the story of the founding and development of the field of developmental science? Which of the interviews and scholarly profiles in the SRCD Oral History Project are you most interested in exploring further?

In the years following World War II, social learning theorists continued to study topics such as aggression but also explored the development of gender-role typing and conscience, as well as the relation between children's social development and parental attitudes, beliefs, and childrearing practices. These studies used a multimethod approach, in which researchers interviewed parents, observed children's play behavior, and observed parent–child interactions. Social learning research highlighted the importance of studying the mutual, bidirectional influence of parent and child. This was a departure from previous approaches that had assumed the direction of influence flowed only from parents to children (Bornstein, 2006; Cairns, 1998).

Attachment researcher Mary Ainsworth was the first researcher to test the predictions of John Bowlby's theory by observing mother-infant interactions.

John Bowlby and Mary Ainsworth

In the 1950s and 1960s, research began on the infant–caregiver attachment relationship. Harry Harlow studied the formation and consequences of attachment in rhesus monkeys at about the same time that John Bowlby used clinical observations of the mother–infant relationship to construct a theory of attachment in humans. Bowlby's influential books include *Attachment* (vol. 1, 1969) and *Separation: Anxiety and Anger* (vol. 2, 1973). Bowlby's theory incorporated ideas from psychoanalytic theory, studies of imprinting and bonding in animals, and theories of cognitive development. Mary Ainsworth was the first researcher to test Bowlby's theoretical predictions by observing mother–infant interactions (Bretherton, 1992).

The rest of the story of the study of infant development up to the present time is told in the remaining chapters of this book, exploring this important period of the lifespan from a topical perspective. This book is not a parenting manual, but you will have opportunities to learn about how the findings might be interpreted and used by parents or adults who work with infants and toddlers. For some topics, there may be more than one right answer; the right answer may vary according to the characteristics of the children in question; or it may not yet be possible to provide definitive answers for anyone. When evaluating answers, the presumption is that objective evidence is more valid than appeals to emotion, tradition, or unsupported beliefs. Above all, the focus is on current findings from systematic studies by researchers whose work uses recognized, accepted research methods, the topic of the next chapter.

PRACTICE AND REVIEW ONLINE

WRAPPING IT UP
Summary and Conclusion

There are many good reasons to study infants and their development from birth to age 3. These reasons include (1) the significant transformation that occurs in every developmental domain; (2) the impact of early experience on development and the availability of tools and information to guide our studies; and (3) increased interest in interdisciplinary collaboration to understand and support healthy development from birth to age 3 and beyond.

All developmental theories address fundamental themes in the study of child development. Theories about child development are usually specific to particular developmental domains. There are many theories that describe development as occurring in a stagewise process, but there are also theories that describe development as a continuous process. Researchers' beliefs about how development occurs may influence the measures and designs they use in their studies and the inferences they draw from their data. There has been debate about whether the transformations during the first three years of life are the result of nurture or nature; researchers today recognize that there is an interaction of heredity and the environment.

Contemporary theories of infant development incorporate infants' surprisingly sophisticated capabilities, and many empirical studies measure changes that result from infants' own actions as well as the actions of their caregivers. Studies of different rates of development and of atypical development inform theories and practice for all children, including those who are more typically developing. Awareness of cultural context and ethnic diversity is

essential if we are to understand the many different settings in which infants develop.

Three major sources of information have been used to study the lives of children who lived in earlier times: (1) literary evidence, including parents' diaries and letters, childrearing advice written by midwives, ministers, and doctors, and children's books; (2) quantitative archival evidence, such as census data, tax records, and legislative and court records; and (3) material culture, such as toys, clothing, furniture, and works of art. Views of children at any given time influence the systems and policies in place to protect children and promote their development.

During the twentieth century, parents increasingly turned to professionals with expertise in the field of child development to provide guidance and answer questions about childrearing. Key figures in the history of child development and the scientific study of children in the United States include G. Stanley Hall, James Mark Baldwin, John B. Watson, Arnold Gesell, John Bowlby, and Mary Ainsworth.

THINK ABOUT IT
Questions for Reading and Discussion

1. Children in the United States and many other industrialized countries are becoming toilet trained at increasingly older ages (Bakker & Wyndaele, 2000; Brody, 1999). Whereas 92 percent of 18-month-olds were toilet trained in 1957, in 1999, only 2 percent of 2-year-olds, and 60 percent of 3-year-olds were reliably toilet trained. (It is not until the age of 4 years that most US children—98%—are finally out of diapers.) Use the information in this chapter to identify some of the factors that might be responsible for this trend.
2. What is the most surprising thing about the history of infancy and childhood that you have learned from this chapter? How does this information affect your views about infants and development from birth to age 3?
3. What do you think was the most important factor influencing the establishment and growth of the field of child development in the United States? Is this factor still important today? Are current conditions right to continue supporting the field of child development? Explain.
4. Do you think that today's parents would support an infant school movement? Why or why not?
5. Which of the recurring themes in the study of child development do you think is the most important? Explain.
6. When you think about the recurring themes in the study of child development, how do you tend to view the key debates? Do you tend to believe more strongly in nature or in nurture as an influence on development? Do you tend to view babies as active or passive participants in their own development? How important do you think culture and the historical era are? Compare your views with the views of others taking this course.

KEY WORDS

continuous (5)
developmental domains (4)
epigenesis (5)
infant mortality rate (11)
literary evidence (9)
material culture (9)
nature (5)
nurture (5)
quantitative archival evidence (9)
stagewise (4)

CHAPTER 2

Research Methods

THE QUESTIONS THAT RESEARCHERS address reflect the times in which they live. Contemporary researchers investigate fundamental questions about the influence of nature and nurture on children's development, but they also have new questions to explore, such as the impact of media or early childcare on very young children. Research methods have also evolved over time. This chapter highlights some of these changes through a pioneering study that involved two languages, two countries, and one little girl.

When Hildegard Rose Leopold was born in 1930, her father, a German linguist, took an immediate interest in her language development. In family conversations, Werner Leopold spoke only German, and his American wife, Marguerite, spoke only English. Beginning when Hildegard was eight weeks old, Werner Leopold documented the development of a child growing up in a bilingual home. The portable recording technology that is so accessible today had not yet been invented, so Leopold wrote notes about Hildegard's vocalizations on slips of paper and spent weekends meticulously organizing them (Hakuta, 1986). Leopold made observations about all aspects of his daughter's language development. The result, *Speech Development of a Bilingual Child: A Linguist's Record* (1939, 1947, 1949), was a four-volume publication covering nearly 900 pages.

Leopold's study provided an important foundation for research on childhood bilingualism, but his approach was extremely labor-intensive and, in the end, provided information about only one child. What alternative research methods might he have used to answer the same questions?

In this chapter, you learn about options available to researchers today, whether their focus is on the development of language, cognition, perception, motor skills, or relationships. You encounter several classic studies of the development of infants and young children. You also see that in the past, as is true today, choosing among the options requires researchers to make decisions about how they will explore their question: the type of setting, the research design, and the measures they will use. The last section discusses ethical concerns and issues that are unique to research with infants.

RESEARCH SETTINGS

Werner Leopold observed and made notes about his daughter's language development in their home in the United States and during extended visits to Germany (Hakuta, 1986). Other researchers also choose to carry out studies in their participants' homes and other everyday settings rather than in a laboratory. Why do they choose those settings, and how do those locations compare to laboratories?

Naturalistic Studies

In some studies, researchers observe infants in **naturalistic settings**—their usual surroundings, such as their own home or their regular childcare center. In some naturalistic research, children's spontaneous behavior is recorded as they interact with their parent or caregiver. This was the case when Fernald and Morikawa (1993), in a cross-cultural study of Japanese and European American families, observed 6-, 12-, and 19-month-old infants and their mothers as they played with toys at home, and compared the pairs' conversations and play themes. In many studies using **naturalistic observation**, researchers remain relatively passive observers; apart from being physically present, they do not intervene in or try to influence the situation. One such study took place in a health clinic and involved the observation of the type and duration of emotion expressions of 2- to 7-month-old infants in response to the acute pain of a diphtheria-pertussis-tetanus (DPT) inoculation (Izard, Hembree, & Huebner, 1987). Although the researchers in this study undoubtedly had an emotional reaction to observing babies cry in pain, they were careful not to show these feelings or interfere as the infants' parents comforted them.

When researchers are becoming familiar with the setting or gathering ideas for future studies, they may create a **narrative record**—a detailed description of the range of behaviors they

naturalistic setting Studies in which researchers observe infants in their usual surroundings, such as their own home or their regular childcare center.

naturalistic observation Studies in which researchers remain relatively passive observers in the sense that, apart from being physically present, they do not intervene in or try to influence the situation.

narrative record A detailed description of the range of behaviors researchers observe.

observe. By contrast, to answer questions about specific, well-defined behaviors, they use techniques that focus on just those target behaviors. In **event sampling**, for example, a small number of behaviors are identified, and the researcher notes each time they occur. A clear **operational definition** is a concrete verbal description that enables researchers to measure target behaviors and outcomes accurately.

Operational definitions are necessary whether studies take place in a naturalistic setting or in a laboratory. Training observers to use a single operational definition increases the likelihood that all members of a research team use the same criteria and minimizes **observer bias**—the phenomenon in which researchers' expectations or beliefs influence the way they record or interpret behavior.

In a laboratory study of toddlers' responses to their mother's verbal and nonverbal behavior during a challenging puzzle task, researchers coded children's display of feelings of pride and shame (Kelley, Brownell, & Campbell, 2000).

> *Pride* was coded when at least three of the following five behaviors occurred within 30 s[econds] following a child-produced success outcome: erect posture (i.e., shoulders back and head up), smile (either open or closed mouth), eyes directed at the experimenter or mother, points to outcome or applauds, or positive self-evaluation (e.g., "Yeah!" or "I did it!"). *Shame* was coded when at least three of the following five behaviors occurred within 30 s following a child-produced task failure: body collapsed, corners of the mouth down turned/lower lip tucked between teeth, eyes lowered with gaze downward or askance, withdrawal from the task situation, or negative self-statements. (p. 1065)

Pride and shame are such familiar emotions that differences between them may seem intuitive or obvious, but the use of clear operational definitions made it possible for different members of the research team to use the same criteria to categorize children's emotional displays. (Table 2.1 shows an example of a checklist that could be used to record data about these behaviors.) Clear operational definitions also make it possible for subsequent researchers to make direct comparisons between their findings and those of the original researchers, whether they are studying pride and shame in a laboratory or in a naturalistic setting.

In some naturalistic studies, researchers take an active role and try to elicit particular child behaviors by creating specific experiences. Jean Piaget (1954), for example, studied his own children in naturalistic settings but tested their reactions to the appearance and

In an observational study of the development of pride, researchers might use an operational definition that includes a set of predetermined behaviors, such as erect posture, smiling, and verbal expressions such as "I did it!"

event sampling A technique in observational research in which a small number of behaviors are identified and the researcher makes a note each time they occur by making a mark on a prepared checklist.

operational definition A clear, concrete verbal description that enables researchers to measure target behaviors and outcomes accurately.

observer bias The phenomenon in which researchers' expectations or beliefs influence the way they record or interpret behavior.

TABLE 2.1 | Example of a Prepared Checklist for Use in Event Sampling*

Success Outcome No.	Erect Posture	Smile	Eye Contact	Positive Self-Evaluation
1				
2				
3				
4				
5				

* To code displays of *pride*, in the 30 seconds following a child-produced success outcome, a mark was made for every instance of the behaviors listed.

Source: Kelley, Brownell, & Campbell (2000).

In one observational study of infants' reactions to pictures in books, researchers both videotaped and took notes about children's manual exploration and vocalizations.

disappearance of objects that he selected and manipulated as well as objects that they encountered on their own.

Like Werner Leopold, Piaget recorded his observations in writing. Contemporary researchers in naturalistic studies take notes too, primarily to provide contextual information later, during the coding of audio or video records. In one study of infants' reactions to pictures in books, researchers both video-recorded and took notes about children's manual exploration and vocalizations (DeLoache, Pierroutsakos, Uttal, Rosengren, & Gottlieb, 1998). Because this study compared infants in the United States and on the Ivory Coast of Africa, notes taken in these settings, especially entries about the presence and function of pictures and picture books in each culture, provided useful contextual information later.

Some naturalistic studies, like DeLoache and colleagues' picture book study, explore phenomena through **ethnographic research**, in which researchers make detailed observations or conduct interviews in everyday settings. Ethnographic research can be carried out in a researcher's own culture, but most ethnographic researchers study behavior in a different culture. Ethnographic methods are a staple of anthropological research—Margaret Mead's famous (1928, 1930) studies of child and adolescent development in Samoa and New Guinea exemplify this tradition. Many psychologists, child development researchers, and health care workers have also used

ethnographic research
A technique for exploring the interaction of culture and biology, in which researchers from a Western culture make observations or conduct interviews in everyday settings in non-Western cultures.

this method to provide comparative data on topics such as sleeping, feeding, discipline, parent–infant interaction, and other infant care practices (Koyama, 2016; O'Neill, Clarke, & Grietens, 2017; Rogoff, Mistry, Göncü, & Mosier, 1993; Small, 1998).

Co-sleeping is a less common practice in the United States than it is in many other parts of the world.

Results of ethnographic studies can be surprising to anyone who assumes that the way infants are cared for in their own culture is the "natural" or "best" way. One revealing ethnographic study compared infants' sleeping arrangements in rural Guatemala and in middle-class homes in the United States (Morelli, Rogoff, Oppenheim, & Goldsmith, 1992). Whereas US parents tended to promote their infants' independent sleeping at an early age, Mayan parents in Guatemala typically slept with their children in the same bed until the next child in the family was born. Whereas some US parents expressed concerns about co-sleeping, Mayan parents regarded the typical US practice as cold and neglectful.

Differences between cultures become even more apparent when members of distinct groups have an opportunity to come into contact with each other. This was demonstrated in an ethnographic study in which agrarian mothers in West Africa and urban, middle-class mothers in Germany were video-recorded as they interacted with their babies. The researcher then showed the two sets of videos to all of the parents and interviewed them about the interactions they saw. This approach helped clarify differences and similarities in the underlying beliefs in each culture about optimal amounts of breastfeeding, body contact and stimulation, object stimulation, and face-to-face contact (Keller, 2003).

Ethnographic studies can also reveal aspects of development that are universal, occurring at about the same age or in the same way, regardless of cultural practices. For example, although there are cross-cultural variations in how much parents speak to their infants and in the degree to which they believe infants are capable of understanding language, the process of language acquisition is remarkably similar across numerous cultures that have been studied (Slobin, 1985). In addition, despite differences in beliefs and in patterns of interaction with infants, parents in countries as diverse as China, Colombia, Germany, Israel, Japan, and the United States tend to agree about the behaviors they believe an "ideally secure" child should exhibit (Posada et al., 1995).

In laboratory settings, researchers have a high degree of control over the environment. This enables them to provide certain types of toys and observe how infants respond, as this researcher is doing.

Naturalistic studies are appealing for a number of reasons, outlined in Table 2.2.

One researcher who used both naturalistic and laboratory settings was Mary Ainsworth. Some of her earliest observations of infant–caregiver interactions

TABLE 2.2 | Comparison of Naturalistic and Laboratory Studies

Naturalistic	Laboratory
Infants' behavior is likely to be typical	Strange environment may elicit strange behavior
Parents may feel comfortable in own home	Parents may feel anxious, self-conscious
Variations may exist across settings	Testing environment can be controlled and standardized for all participants
Good source of ideas for further study	Ideal for studying behavior that occurs only infrequently in naturalistic settings
Requires adjustment to equipment and researchers	Equipment and researchers can be hidden
High external validity, low internal validity	Low external validity, high internal validity
An integral part of ethnographic research	Ideal for normative studies and studies requiring specialized equipment and stimuli

were carried out in children's homes (Ainsworth, 1967), but her later research resulted in the development of the Strange Situation—a standard laboratory procedure for investigating the infant–caregiver relationship (Ainsworth, Blehar, Waters, & Wall, 1978).

Laboratory Studies

laboratory setting A specially designed research space that enables researchers to control or eliminate the influence of irrelevant or distracting factors.

independent variable Aspects of a research setting that researchers identify or vary, such as presence or absence of an infant's mother, in order to determine their effect on behaviors of interest.

dependent variable The main behavior or response of interest in a study; this is the researchers' measure of the impact of the independent variable(s).

One potential problem with naturalistic settings is the degree to which they vary across dimensions that may make a difference in children's behavior. Parent–infant interactions in a home where a boisterous older sibling is playing nearby or a television is turned on are likely to be different from interactions in a home in which there are few distractions and little background noise. By using a standard **laboratory setting**—a specially designed research space—researchers are able to eliminate extraneous nuisance factors, such as ringing telephones and barking dogs. This allows them to focus on the influence of selected **independent variables**—the conditions that they are interested in studying—in order to see how they affect the **dependent variable**—behaviors of interest. Researchers who want to study the effect of older siblings on infants' interactions with their mothers, for example, might use the independent variable of "group composition" to compare infant–mother pairs with infant–mother–sibling trios in terms of the amount of physical contact that occurs between the infant and mother (the dependent variable). In other studies using laboratory settings, researchers may intentionally vary other conditions, such as

the presence and type of toys or the amount of potentially distracting background noise. When these factors are systematically varied, their influence on the infant's behavior (the dependent variable) can be more clearly understood.

The focus of the investigation may also influence researchers' choice of a laboratory setting instead of a naturalistic setting. Researchers studying the development of perceptual abilities, for example, often show babies computer-generated video displays (e.g., Arterberry & Bornstein, 2002) or examine their crawling and walking in specially designed environments (e.g., Karasik, Tamis-LeMonda, Adolph, & Dimitropoulou, 2008). As you will see later in this chapter, researchers who study newborns' perceptual abilities often record behavioral measures, such as heart rate or sucking rate, in response to carefully presented stimuli (e.g., Moon, Cooper, & Fifer, 1993). Similarly, researchers who explore prenatal development or fetal responses to external stimuli depend on ultrasound scanners and fetal heart rate monitors. Studies like these require the presence of equipment that is not found in infants' homes, childcare centers, or other naturalistic settings.

Table 2.2 summarizes the advantages of laboratory settings, which include their utility when studying behaviors that occur infrequently in the natural environment. For example, a researcher who wanted to study toddlers' responses to obstacles set up barriers of different heights and materials (e.g., opaque versus transparent) in a narrow laboratory hallway and asked parents to call to their children from the other side of the barrier, encouraging them to cross over it (Schmuckler, 1996). Parents of infants and toddlers often "baby-proof" their homes by removing furniture that affords climbing and installing safety gates at the top and bottom of staircases. It is unlikely, therefore, that the researcher would have been able to observe infants being allowed to climb and step over barriers in a naturalistic setting.

Many researchers choose laboratory settings because they allow a significant degree of control over the conditions in which participants' behavior will be observed, such as ensuring that the temperature and background noise level in the room are the same for everyone. In laboratory settings, it is also easier for researchers to manipulate independent variables, such as the effect of a mother's presence versus absence on her young child's free play behavior. The greater the degree of control researchers have over independent variables, the more confident they can be that any differences they find between groups, such as differences in free play behavior between a mother-present and a mother-absent group of toddlers, may be attributed to the independent variable, in this case, the presence or absence of the mother. When researchers have this sort of control, their studies are said to have high **internal validity**—the degree to which differences in the dependent variable (free play behavior) are caused by differences in the independent variable (mother's presence versus absence). A study is said to have low internal validity when alternative explanations cast doubt on the effects of the independent variable. This might happen if an unintended difference existed between the mother-present and mother-absent groups of toddlers,

internal validity The degree to which differences in the dependent variable are actually due to differences in the independent variable.

such as the presence of familiar versus unfamiliar toys, that could have influenced the toddlers' motivation to play.

If internal validity is so desirable, why does research also take place outside of controlled laboratory settings? One reason is that the internal validity of a study is related to that study's **external validity**—the degree to which the findings can be extended, or generalized, to other samples and settings. If mother's presence versus absence has an influence on free play behavior for only one sample of toddlers, for example, but not other samples in subsequent studies, the original study would be said to have low external validity because the results apply so narrowly. Studies need to have both internal validity and external validity, so researchers must consider both when designing and carrying out their investigations.

RESEARCH DESIGNS

Werner Leopold might have used a number of alternative research designs to study the language development of his young bilingual daughter. Each design has its strengths and weaknesses, and researchers need to keep these characteristics in mind as they consider their options.

Case Studies and Single-Subject Research

The approach Werner Leopold took is an example of a **case study**—an in-depth examination of a single individual. Well-known case studies were carried out in psychology by Sigmund Freud and Jean Piaget. Susan Curtiss (1977) studied the language development of Genie—an abused, socially isolated, apparently nonverbal girl who came to the attention of authorities at the age of 13 years (also see Rymer, 1993). Another often-cited case study of an infant was published by Charles Darwin about his son Doddy. Although Darwin was not the first to carry out detailed observations of his own child, when his article appeared in 1877 (based on notes he had taken while observing his son 37 years earlier), it gave legitimacy to the systematic study of children. Darwin's publication inspired many parents to write their own **baby biographies** (observational records of their infants' early development). These parents probably did not realize that Darwin had followed in the footsteps of others, such as Dietrich Tiedemann (1787), who is generally credited as the author of the first psychological diary of longitudinal development in children (Cairns, 1998).

external validity The degree to which the findings of one study can be extended, or generalized, to other samples and settings.

case study Also referred to as the clinical method, this is an in-depth examination of a single individual.

baby biography Observational records made by parents or other caregivers of an infants' early development.

Another well-known study of an individual infant's development was begun in 1893 by Millicent Washburn Shinn (the first woman to earn a PhD in psychology from the University of California). Shinn's (1900/1985) book, *The Biography of a Baby*, was based on a day-by-day account of her niece Ruth's first year of life. Shinn recognized that her niece did not represent all babies and might even differ greatly from others. Still, she believed that the case study approach offered unique advantages, explaining, "If I should find out that a thousand babies learned to stand at an average of 46 weeks and two days, I should not

BOX 2.1 | Single-Subject Research

An example of single-subject research is one-on-one intervention with children with autism spectrum disorders (ASD, discussed in more detail in Chapter 9). Researchers use principles of applied behavior analysis and operant conditioning (rewards and punishment) to reduce undesirable behaviors (e.g., temper tantrums) and increase desirable behaviors (e.g., using language, making eye contact, and playing with toys). In many interventions, parents of children with ASD are taught to use these techniques at home (Gale, Eikeseth, & Rudrud, 2011; Marshall, Ware, Ziviani, Hill, & Dodrill, 2014; Nelson, Paul, Johnston, & Kidder, 2017).

To understand how this approach works, consider the goal of reducing feeding problems by increasing appropriate eating behavior in very young children on the autism spectrum (Bui, Moore, & Anderson, 2013). Working with the child one-on-one, researchers record the initial, baseline level of appropriate eating and then begin systematically rewarding (praising) the child each time he or she engages in that behavior. At first, the child is praised for even slight approximations of the target behavior, such as allowing a spoon with food in it to be held near his or her mouth. By contrast, if the child refuses to accept the spoon or exhibits undesirable behaviors, the researcher (or parent) ignores those behaviors. Eventually, the child is praised only for the complete behavior that is being targeted, such as accepting and eating a bite of food from the spoon. Throughout the sessions, the duration of the child's appropriate feeding behavior is recorded, and if the intervention has been successful, it will be evident to anyone examining the record.

Questions

1. What are some of the advantages and disadvantages of single-subject research?
2. Give an example of how single-subject research could be used to decrease the frequency of a toddler's undesirable behavior at bedtime.

know as much that is important about standing, as a stage in human progress, as I should after watching a single baby carefully through the whole process of achieving balance on his little soles" (p. 11).

In the case studies described so far, researchers documented the naturally occurring behavior and development of a single child, without intervening or otherwise manipulating the child's experience. In other case studies, researchers do intervene or study the effects of an experimental manipulation on a single participant; these studies are referred to as **single-subject research** (discussed further in Box 2.1).

Single-subject research gives the researcher more control and internal validity than a case study that is primarily descriptive. As shown in Table 2.3, however, both types of studies have limitations, beginning with external validity concerns about the degree to which the individual being studied is representative of other people. Indeed, the more unique the subject of the study, the less likely the results can be tested and replicated in future research. Another concern is the possibility that the researcher may be theoretically biased when interpreting the data. Although the evidence suggests that Werner Leopold was an objective observer (Hakuta, 1986), it is easy to imagine that

single-subject research
A variation of the case study, in which researchers intervene or study the effects of an experimental manipulation within a single participant.

case studies carried out by parents might not always provide an accurate record. Case studies and single-subject research are valuable, however, for the detail that they provide about individual children. They may also point researchers to aspects of development that can be studied with larger samples.

Quasi-Experimental Studies

Many researchers use a **quasi-experimental design** (also referred to as a nonexperimental design) to collect information about groups of participants that are already formed before the study begins. For practical reasons, this design is used in the investigation of preexisting group variables such as culture, race, ethnicity, and gender, where participants cannot be randomly assigned to a group. For ethical reasons, this design is the only option available for topics such as the effect of preterm birth, prenatal exposure to alcohol, or the impact of child abuse, since researchers cannot ethically induce these experiences (see Table 2.3). In quasi-experimental studies, researchers compare the groups they select in terms of dependent variables of interest, such as physical growth, motor development, or language acquisition.

quasi-experimental design A design in which researchers collect information about groups of participants that are already formed before the study begins.

If Werner Leopold had used a quasi-experimental design, he might have studied children whose parents had already decided to bring them up bilingually, and he could have compared their language development with the language development of children growing up in monolingual homes. (For both practical and ethical reasons, it would not be possible to randomly assign children and their families to monolingual or bilingual groups.) The results of this hypothetical study could indicate whether there is a relationship

TABLE 2.3 | Comparison of Three Research Methods

Case Study/Single Subject	Quasi-Experimental	Experimental
Permits in-depth study of a single individual	Compares preexisting groups	Creates groups for comparison, using random assignment
External validity may be low, especially if individual is very unique	External validity is high	External validity may be low
Internal validity is high in single-subject experiments, but not in descriptive case studies	Internal validity may be low; inferences about cause and effect cannot be drawn	Internal validity is high; conclusions about cause and effect can be made
May suggest topics for research with larger samples	The only design available for many topics where ethical or practical considerations make random assignment to groups impossible	The best design for topics that allow experimental manipulation and random assignment to groups

between the number of languages to which a child is exposed from birth and the rate of that child's language development.

If Leopold found that children in monolingual homes were more advanced in their language development than children from bilingual homes, he might conclude that learning more than one language during childhood is detrimental to language development. This finding would not permit him to infer, however, that early exposure to more than one language *causes* slower language development than early exposure to just one language. Alternative explanations would still need to be considered, such as the impact of other differences between the two groups of families. These differences might include the children's intellectual abilities, parents' attitudes about the language(s) they speak, families' economic resources, or even the amount of verbal interaction each child experiences.

Unless Leopold could rule out the effect of these other differences, a study like this one would have low internal validity. There are some steps that could be taken to strengthen any causal inferences that might be drawn. One approach would be to equate the families in each group on other factors that could be related to child language outcomes. This would leave only the number of languages in the child's home—one or two—to vary between the families. Another approach would use statistical procedures to "partial out" the effect of nonlanguage differences between groups. Even with these adjustments, Leopold would never be able to remove the influence of all of the potentially important factors, and any causal conclusions would still need to be viewed as tentative.

Experimental Studies

In contrast to quasi-experimental studies, inferences about cause and effect can be drawn from studies using an **experimental design**—a design that examines the effect of an independent variable on a dependent variable (see Table 2.3). Experiments employ **random assignment** (using a random number table or another nonsystematic procedure) to place each participant into one of two or more groups that represent different aspects of the independent variable. When random assignment is used, each participant has an equal chance of ending up in each of the groups being compared in the experiment.

experimental design A design that examines the influence of an independent variable on a dependent variable.

random assignment The equivalent of flipping a coin, this technique is used to ensure that each child has an equal chance of being placed into the different groups being compared on a specific dependent variable. As a result of this precaution, potentially important differences across children are distributed across the different groups.

In the earlier discussion of laboratory studies, there were two conditions of the independent variable being compared—presence versus absence of the mother—and the dependent variable was the child's free play behavior. If children were randomly assigned to either the mother-present or the mother-absent condition, and if a greater quantity or higher quality of play behavior was found for children whose mothers were present, the researchers could conclude that the presence of a child's mother increases or improves the child's play behavior. In fact, the researchers in this example could be relatively confident that something about maternal presence *caused* the difference in play behavior between the two groups of children. They would still need to determine *how* maternal presence exerts its effects—through the mother's direct involvement in the child's play,

as a result of suggestions that she makes to the child from the sidelines, or just by providing a comforting presence in the room.

How might Werner Leopold's study have been adapted to an experimental design? One way would be to bring young children growing up in bilingual homes into a laboratory setting and explore their ability to learn a set of new words made up by the researcher (words like *bleg, thrip*, and *lart*). All of the children would be shown an object to accompany the new word, but half of the children would be taught the new word by their mother, whereas the other half would be taught by an unfamiliar person (the researcher). If Werner Leopold used random assignment, potentially important differences between the two groups of children might still exist, but their influence could be controlled through random assignment, ensuring that each child would have an equal chance of being taught by either a familiar person or an unfamiliar person. Random assignment would also distribute potentially important differences among children in the two teaching conditions. The results of this hypothetical experiment would indicate whether bilingual children learn new words better when the teacher is a familiar or an unfamiliar person.

As a result of random assignment, an experiment like this one would have a relatively high level of internal validity. It could be criticized for having relatively low external validity, however, because even if the findings were replicated in other samples of bilingual children studied by other researchers, the use of nonsense words would limit its generalizability to children's acquisition of real languages in naturalistic settings. The best plan, since no research design is without weaknesses, may be to use more than one approach and determine whether the results of different kinds of studies using different measures tend to agree or disagree (Bornstein, 2002; Brewer & Hunter, 1989; Vijver, Hofer, & Chasiotis, 2010).

RESEARCH DESIGNS FOR STUDYING DEVELOPMENT

Implicit in all developmental research is the goal of understanding how behaviors and abilities change with age and experience. When Werner Leopold studied his daughter's language development, he chose an intensive approach when she was a newborn and continued recording his observations into her adolescence. Numerous other researchers have also studied their subjects over a span of months or even years, although most have not gathered the staggering quantity of data that Leopold amassed. The next section examines several classic examples of longitudinal studies and considers the advantages and disadvantages of this research design (see Table 2.4).

longitudinal research
A developmental design in which investigators study the same sample of participants over time, taking measures of their behavior or ability at specified intervals.

Longitudinal Research

In **longitudinal research**, investigators study the same sample of participants at two or more points in time, measuring their behavior or ability at specified intervals. Longitudinal research enables

TABLE 2.4 | Comparison of Three Developmental Research Designs

Longitudinal	Cross-Sectional	Microgenetic
Charts individual change or stability over time	Does not provide information about individual change or stability	Ideal for studying infants' rapidly developing skills, showing individual change or stability
Can reveal relations between early functioning and later development; is ideal for showing long-term effects of interventions	Does not provide information about participants at later ages	Focuses on a short period of time, not usually linked to performance at later ages
Time consuming, expensive, susceptible to attrition of participants over time	Economical and efficient, with lower chance of attrition	Time-consuming and labor-intensive study of a relatively small sample; likelihood of attrition is low
Results may apply only to the cohort of participants studied	Does not differentiate between differences due to age and differences due to cohort	Results may apply only to individuals involved in study

researchers to chart individual change or stability over time, revealing relations between early functioning and later development. Depending on the research questions, the time interval between observations may be mere weeks or many years. In a longitudinal study of the development of babies' social smiling, for example, researchers compared video-recordings of infant–mother interaction in samples from two sociocultural contexts (Germany and Cameroon) when the infants were 6 weeks old and again at 12 weeks. This relatively brief period of time was enough to document the emergence of differences; whereas 6-week-old infants and their mothers in both cultures smiled at each other for similar, minimal amounts of time, at 12 weeks, German infants and their mothers smiled at and imitated each other more often than did the Cameroon sample (Wörmann, Holodynski, Kärtner, & Keller, 2012).

Longitudinal designs can be used with a small number of participants, as illustrated by Werner Leopold's case study. It is more common, though, for longitudinal studies to gather data from a relatively large number of participants. One pioneering longitudinal study observed approximately 700 Hawaiian children over a period of 30 years, identifying factors in some children's lives that helped them triumph over early adversity, poverty, and neglect (Werner, 1989, 2000).

In contrast to the findings of research on social and emotional development, longitudinal studies of intelligence have generally produced only modest evidence of continuity when measures in

infancy are compared with measures in childhood and adolescence. One of the problems in this research is a lack of **measurement equivalence**—correspondence between the measures, or dependent variables, used at two different points in time (Miller, 1998). Whereas IQ tests in childhood and beyond typically rely on verbal ability, intelligence tests for babies tend to focus on nonverbal, motor abilities.

Longitudinal designs are a good way to evaluate the effects of interventions on development. Researchers working on the Abecedarian Project, for example, used a longitudinal design to study children from the time they were 6 weeks of age until they entered adulthood (e.g., Campbell et al., 2012; Campbell et al., 2008; Ramey et al., 2000). By comparing children randomly chosen to participate in an early childhood education program and children randomly chosen to receive pediatric and social work services, nutritional assistance, and home visits, the researchers were able to assess the influence of the education program in a number of developmental domains.

Longitudinal studies are not ideal for all researchers or all research questions. One disadvantage is that they are usually time consuming. To gather data about how a given behavior or ability changes across childhood and into adolescence, for example, researchers need to commit themselves to studying the same group of individuals for nearly two decades. This problem is obviously less relevant when studies examine development from birth to the age of 2 or 3 years, since intervals of even a few weeks or months can reveal dramatic developmental change (Miller, 1998; Tikotzky & Sadeh, 2009; Wörmann et al., 2012).

Keeping track of all of the participants in a longitudinal study over many years can be expensive, and some participants may decline to continue in the study or become unavailable for a variety of reasons. In some longitudinal studies, such as those investigating intelligence or cognitive abilities, it may be unclear whether participants' performance improves as a result of the development of more advanced abilities or as a result of repeated exposure to the measures of those abilities, a phenomenon known as a **practice effect**. Again, these problems tend to be of less concern for researchers studying developmental change over the period of infancy.

Finally, it is not always clear in longitudinal research whether the results obtained for a particular group or generation, known as a **cohort** of participants (such as infants born in the same year), are generalizable to other groups. The reason for concern about generalizability to other cohorts is especially evident when considering studies that were begun in the 1920s or 1930s. The individuals in these studies experienced a particular set of historic events, including the Great Depression, World War II, the Korean War, and the Vietnam War, and they lived in a society that has changed dramatically, especially in terms of technology, civil rights, and educational and work opportunities for girls and women. It is reasonable, therefore, to ask whether and how the course of their development compares to the development of children born in the 1960s, the 1990s, or the twenty-first century.

measurement equivalence Correspondence between the measures, or dependent variables, used at two different points in time.

practice effect Improvement in participants' performance as a result of the repeated exposure to the measures of those abilities.

cohort A particular group or generation of participants, such as infants born in the same year.

Cross-Sectional Research

Given the practical limitations of longitudinal studies, most developmental researchers choose to conduct **cross-sectional research**. In cross-sectional designs, two or more age groups of participants are compared in terms of their behavior or ability at the same point in time. If Werner Leopold had used a cross-sectional design, he could have gathered data covering the same range of ages by comparing different groups of English–German bilingual children between 8 weeks and 14 years. Instead of spending 14 years, he could have finished his study in just one year.

Cross-sectional studies can provide important supporting evidence for longitudinal findings. In comparison to longitudinal studies, cross-sectional research is typically less time consuming, less expensive, and more flexible because new variables can be explored in subsequent cross-sectional studies. The problems of participant loss and practice effects are of less concern in cross-sectional studies than in longitudinal research.

Even when cross-sectional studies reveal differences between age groups, it cannot be assumed that the differences are due to developmental change. If researchers are not careful when selecting their sample, they will have difficulty disentangling the influence of age from the influence of other "nuisance" variables. In Leopold's research, these nuisance variables might include differences in the families' economic resources or in the amount of English and German to which children in various families are exposed. Another potential problem, especially in cross-sectional studies comparing a wide range of ages and older samples, such as 10-, 20-, 30-, and 40-year-olds, is that age differences may reflect generational differences—**cohort effects**. Infancy researchers, fortunately, are probably safe in assuming that 12-, 18-, and 24-month-olds all represent the same cohort (Miller, 1998).

Microgenetic Research

Cross-sectional studies reveal age differences and suggest developmental differences, but they do not provide information about *how* development occurs. Researchers who want to understand developmental processes as they occur within the same individual have turned recently to what might be thought of as a very short-term longitudinal design—**microgenetic research**. In microgenetic studies, participants are observed in a relatively large number of sessions over a short period of time, with the researchers gathering a rich set of data on which fine-grained analyses can be performed. Microgenetic analyses are applicable across many different developmental domains and can be adapted to a wide variety of settings, including those outside of a laboratory (Siegler, 2006).

The microgenetic method has been used to shed light on older children's cognitive development and problem solving (Siegler, 2006; Siegler & Crowley, 1991). In a study comparing children with and without cognitive disabilities, the microgenetic approach was applied over a period of 12 weeks to document changes in the strategies used to solve math and reading problems. The results revealed a number

cross-sectional research A developmental design in which two or more age groups of participants are compared in terms of their behavior or ability at the same point in time.

cohort effects A problem in cross-sectional research, in which age differences may actually stem from generational, or cohort, differences.

microgenetic research A developmental design in which participants are observed over a period of time, perhaps 10 or more sessions, with the researchers gathering a rich set of data on which fine-grained analyses can be performed.

of similarities between the two groups of children that had not been detected in other studies using less frequent measures of learning (Fletcher, Huffman, Bray, & Grupe, 1998).

In studies of infants, the microgenetic approach has been used to investigate the onset of walking (Adolph, 1995) and reaching (Thelen & Smith, 1994; Thelen & Spencer, 1998), as well as the development of infants' manual and oral exploratory responses to objects presented over several sessions (Jones, 1996). Patterns of vocalization and emotional communication have also been analyzed in videotapes of mother–infant play made over a period of 4 to 7 months (Pantoja, Nelson-Goens, & Fogel, 2001).

If Werner Leopold had been able to use modern technology to record samples of his daughter's language, and if his study had covered a vastly briefer period of time (e.g., 24 to 30 months of age), it would have been similar to some contemporary microgenetic studies. Microgenetic studies generally have a much smaller number of participants than cross-sectional studies because of the dense sampling of behavior and detailed analysis of videotapes. Although microgenetic studies are labor intensive, the new insights they may provide make them an attractive option for some researchers.

In addition to selecting a setting and design for their question, researchers also need to choose a response measure. The age and abilities of the research participants play an important role in this choice, and as we discuss next, infants present special challenges to researchers. There are advantages to studying infants, however, because unlike older children and adults, they are often unaware that they are participating in research. Once infants have adjusted to the unfamiliar laboratory setting, researchers are likely to see them exhibiting typical behaviors.

RESEARCH MEASURES

The specific question the researcher is asking influences the measures chosen in a study. In studies of infant–parent relationships, it makes sense to measure behaviors that occur during infant–parent interactions, such as play, emotional communication, and physical contact. In investigations of language development, by contrast, researchers focus on aspects of communication, both verbal and nonverbal. This section examines the range of response measures that are used in studies with infants, as shown in Table 2.5. Some researchers choose to measure behaviors that infants display spontaneously, while others focus on behaviors that they teach infants to perform. In some studies, researchers do not directly observe infant behaviors but instead gather parental reports about their infants or examine data and records that other researchers have gathered.

Behavioral Responses

Newborn and very young infants are capable of making a number of simple behavioral responses, such as looking and sucking, that researchers can use to investigate their perceptual and cognitive abilities.

TABLE 2.5 | Response Measures for Studying Infant Behavior and Development

Response Measure	Examples
Behavioral	
Psychophysiological	
Involuntary responses to stimuli and events in the testing environment.	• Heart rate • Cortisol level • Brain activity measured with electroencephalography (EEG), event-related potential (ERP), functional Near Infrared Spectroscopy Neuroimaging (fNIRS), and magnetoencephalography (MEG)
Visual Behavior	
Spontaneous "looking time" and scanning responses to stimuli and events in the testing environment. Behavior may be coded by human researchers or with automated eye-tracking equipment.	• Visual fixation • Visual preference • Habituation/dishabituation
Conditioned Behavior	
Responses to stimuli that are reinforced by contingencies in the testing environment. When infants learn that their behaviors produce a rewarding outcome, researchers can vary the stimuli and note whether the infant displays the conditioned behavior under those circumstances.	• Conditioned sucking • Conditioned headturning
Parental Report	• Diary reports • Checklists • Rating scales • Questionnaires
Archival Research	• Census records • Childcare manuals and parenting magazines • Equipment used to care for infants • Vital statistics, such as births and deaths

Thus, if responses do not depend on more advanced behaviors, such as the ability to reach, crawl, or speak, it is possible to ask even very young infants specific questions and end up with useful, interpretable answers. Almost any behavior that infants display spontaneously can be used as a dependent variable.

Psychophysiological Measures Some researchers use psychophysiological measures to gauge infants' responses to stimuli. Heart rate is one of the most popular of these measures because it can be recorded in response to any sort of stimulus, whether it involves infants' vision, hearing, or sense of taste, touch, or smell (Miller, 1998). When infants are orienting and attending to stimuli, their heart rate tends to slow down. Heart rate is also attractive to researchers because it can be used with infants of any age and does not depend on motor skills. Changes in heart rate can be measured even when overt behavioral changes are not apparent. Some researchers have combined measures of heart rate and other behavioral responses in the same study. These studies have shown, for example, that infants who do not show behavioral signs of stress when their parent leaves the room sometimes have changes in heart rate that are consistent with a psychological stress reaction.

Other studies using psychophysiological responses have measured levels of the stress hormone cortisol in the saliva of infants and young children (Crockett, Holmes, Granger, & Lyons-Ruth, 2013; Hutt, Buss, & Kiel, 2013; Watamura, Kryzer, & Robertson, 2008). Cortisol levels can be measured between 15 and 45 minutes after a stressful event, whether the stress is the result of a medical procedure like circumcision, a painful inoculation, a distressing separation from the parent, or interactions in a play group of unfamiliar children in an unfamiliar setting. Cortisol can be gathered from saliva that collects in flavored dental pads the child has chewed or sucked on. Cortisol levels fluctuate naturally during the course of the day, however, so researchers need to be aware of these normal rhythms when examining their data.

electroencephalography (EEG) A measurement of electrical activity and spontaneous natural rhythms in the brain.

event-related potential (ERP) A measurement of electrical activity resulting in the brain from the presentation of discrete stimuli.

functional near infrared spectroscopy neuroimaging (fNIRS) A tool for studying brain activity and cognition, in which infants wear a special cap embedded with detectors that measure changes in blood oxygen levels in the cortex. The fNIRS device is noiseless and relatively portable, making it a child-friendly alternative to MRI scans.

magnetoencephalography (MEG) A noiseless, whole-head system for measuring and mapping changes in the levels of magnetic activity produced by neurons in response to visual or auditory stimuli.

Some researchers measure electrical activity in the infant's brain, using sensitive electrodes that rest on the scalp, as shown in Figure 2.1. Recordings of the spontaneous natural rhythms of the brain can be made using **electroencephalography**, or **EEG**. The EEG procedure is attractive because it is both noninvasive and relatively inexpensive. It is not well suited to the study of cognition because it does not reveal brain activity in response to particular stimuli, but it is sensitive to state changes and can be used in studies of social and emotional development. Electrical activity resulting from the presentation of discrete stimuli can be measured with the cortical **event-related potential**, or **ERP**. ERP has been used in studies of infants' cognitive abilities, including attention, memory, and language comprehension. One difficulty in applying ERP methodology to infants is that muscle or eye movements can produce responses that are not related to the stimulus under study (Johnson, 1998; Nelson & Bloom, 1997; Shonkoff & Phillips, 2000).

Cognitive neuroscience researchers also use two other measures shown in Figure 2.1: **functional near infrared spectroscopy neuroimaging (fNIRS)** and **magnetoencephalography (MEG)**. In fNIRS, infants wear a special cap embedded with detectors that measure changes in blood oxygen levels in the cortex (Ferrari & Quaresima, 2012; Lloyd-Fox, Blasi, & Elwell, 2010). The equipment used