The Developing Child

Denise G. Boyd Helen L. Bee

Thirteenth Edition

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Table of Contents

GLOSSARY

adaptive reflexes Reflexes that are essential to the infant's survival but that disappear in the first year of life.

ability goal A goal orientation associated with a desire to be superior to others.

academic approach An approach to early childhood education that provides children with instruction in skills needed for success in school.

accommodation That part of the adaptation process proposed by Piaget by which a person modifies existing schemes as a result of new experiences or creates new schemes when old ones no longer handle the data.

achievement test Test designed to assess a child's learning of specific material taught in school, such as spelling or arithmetic computation; in the United States, achievement tests are typically given to all children in designated grades.

adaptation The processes through which schemes change.

ADHD/combined type ADHD in which both hyperactivity and inattention are problems.

ADHD/hyperactive/impulsive type ADHD in which hyperactivity is the main problem.

ADHD/inattentive type ADHD in which inattention is the main problem.

adolescent-onset conduct disorder A conduct disorder that begins only in adolescence; it is typically less severe and persistent than childhood-onset conduct disorder.

affectional bond An enduring tie to a partner, viewed as unique.

aggression Behavior that is aimed at harming or injuring another person or object.

agreeableness One of the Big Five personality traits; a person who scores high on this trait is characterized by trust, generosity, kindness, and sympathy—also shapes future experience.

amnion The sac, or bag, filled with liquid in which the embryo/fetus floats during prenatal life.

analytical intelligence One of three types of intelligence in Sternberg's triarchic theory of intelligence; the type of intelligence typically measured on IQ tests, including the ability to plan, remember facts, and organize information.

androgynous One of four sex-role types suggested by the work of Bem and others; a type characterized by high levels of both masculine and feminine qualities.

anorexia nervosa Eating disorder characterized by self-starvation.

anoxia A shortage of oxygen. This is one of the potential risks at birth, and it can result in brain damage if it is prolonged.

Asperger's disorder A disorder in which children possess the other characteristics of autistic disorder but have intact language and cognitive skills.

assimilation That part of the adaptation process proposed by Piaget that involves absorbing new experiences or information into existing schemes. Experience is not taken in 'as is,' however, but is modified (or interpreted) somewhat so as to fit the preexisting schemes.

association areas Parts of the brain where sensory, motor, and intellectual functions are linked.

attachment A type of affectional bond in which the presence of the partner adds a special sense of security, a 'safe base,' for the individual.

attachment behaviors The collection of (probably) instinctive behaviors of one person toward another that bring about or maintain proximity and caregiving, such as the smile of the young infant; behaviors that reflect an attachment.

attention deficit hyperactivity disorder (ADHD) A disorder in which a child shows both significant problems in focusing attention and physical hyperactivity.

attention problems A category of psychopathologies that impair one's ability to concentrate, including attention deficit hyperactivity disorder, attention deficit disorder, and hyperkinetic disorder.

atypical development An enduring pattern of behavior that is unusual, compared to the behavior of others of the child's age, and that interferes with the child's development in some significant way.

auditory acuity How well one can hear.

authoritarian style One of the three parental styles described by Baumrind, characterized by high levels of control and maturity demands and low levels of nurturance and communication.

authoritative style One of the three parental styles described by Baumrind, characterized by high levels of control, nurturance, maturity demands, and communication.

autistic disorder A disorder in which children have much more limited language skills than others of the same age, an inability to engage in reciprocal social relationships, and a severely limited range of interests.

automaticity The ability to recall information from long-term memory without effort.

axons Tail-like extensions of neurons.

babbling The repetitive vocalizing of consonant-vowel combinations by an infant, typically beginning at about 6 months of age.

balanced approach Reading instruction that combines explicit phonics instruction with other strategies for helping children acquire literacy.

Bayley Scales of Infant Development The best-known and most widely used test of infant 'intelligence.'

behavior genetics The study of the genetic contributions to behavior or traits such as intelligence or personality.

behaviorism The theoretical view that defines development in terms of behavior changes caused by environmental influences.

Big Five The five primary dimensions of adult personality identified by researchers: extraversion, agreeableness, conscientiousness, neuroticism, and openness/intellect.

bilingual education As practiced in the United States, a school program for students who are not proficient in English in which instruction in basic subject matter is given in the children's native language during the first 2 or 3 years of schooling, with a gradual transition to full English instruction over several years.

birth order A child's position in the sequence of children within a family, such as first-born, later-born, or only child.

blastocyst Name for the mass of cells from roughly 4 to 10 days after fertilization.

blended family A family that is established when a single parent marries a nonparent or parent.

BMI-for-age Comparison of an individual child's BMI against established norms for his or her age group and sex.

body mass index (BMI) A measure that estimates a person's proportion of body fat.

bone age A measure of physical maturation based on x-ray examination of bones, typically the wrist and hand bones. Two children of the same chronological age may have different bone age because their rates of physical maturation differ.

bulimia Eating disorder characterized by alternating periods of bingeing and purging.

cell body The part of the cell that contains the nucleus and in which all the cell's vital functions are carried out.

centration The young child's tendency to think of the world in terms of one variable at a time.

cephalocaudal One of two basic patterns of physical development in infancy (the other is proximodistal), in which development proceeds from the head downward.

cerebral cortex The convoluted gray portion of the brain, which governs perception, body movement, thinking, and language.

cesarean section (C-section) Delivery of the child through an incision in the mother's abdomen.

childhood-onset conduct disorder Conduct disorder beginning in childhood; the pattern is linked to rejection by peers and to conduct problems that persist into adolescence and adulthood.

chorion The outer layer of cells of the blastocyst during prenatal development, from which both the placenta and the umbilical cord are formed.

chromosomes The structures, arrayed in 23 pairs, within each cell in the body that contain genetic information. Each chromosome is made up of many segments, called genes.

class inclusion The principle that subordinate classes of objects are included in superordinate classes.

classical conditioning One of three major types of learning. An automatic, or unconditional response such as an emotion or a reflex comes to be triggered by a new cue, called the conditional stimulus, after having been paired several times with that stimulus.

clinical depression (major depressive disorder) A combination of sad mood, sleeping and eating disturbances, and difficulty concentrating that lasts six months or longer.

clique A group of four to six friends with strong affectional bonds and high levels of group solidarity and loyalty; the term is used by researchers to describe a self-chosen group of friends.

cognitive-developmental theories Developmental theories that emphasize children's actions on the environment and suggest that age-related changes in reasoning precede and explain changes in other domains.

cohort A group of individuals who share the same historical experiences at the same times in their lives.

colic A pattern of persistent and often inconsolable crying, totaling more than three hours a day, found in some infants in the first 3 to 4 months of life.

color constancy The ability to see the color of an object as remaining the same despite changes in illumination or shadow.

competence A person's basic, underlying level of skill, displayed under ideal circumstances. It is not possible to measure competence directly.

concrete operations stage Piaget's term for the stage of development between ages 6 and 12, during which children become able to think logically.

conduct disorder Diagnostic term for a pattern of deviant behavior including high levels of aggressive, antisocial, or delinquent acts.

conscience The list of 'don'ts' in the superego; violation of any of these leads to feelings of guilt.

conscientiousness One of the Big Five personality traits; a person who scores high on this trait is characterized by efficiency, organization, planfulness, and reliability.

conservation The understanding that the quantity or amount of a substance remains the same even when there are external changes in its shape or arrangement.

constraint As used in discussions of language development, an assumption that is presumed to be built-in or learned early (a 'default option') by which a child figures out what words refer to. Examples include the principle of contrast and the whole object constraint.

control group A group of participants in an experiment who receive either no special treatment or some neutral treatment.

conventional morality The second level of moral development proposed by Kohlberg, in which a person's judgments are dominated by considerations of group values and laws.

conventional rules As defined by Turiel, arbitrary, socially defined rules specific to a particular culture, subculture, group, or setting, such as 'Don't run in the halls' or 'Smoking allowed only in designated areas.'

cooing Making repetitive vowel sounds, particularly the uuu sound; the behavior develops early in the prelinguistic period, when babies are between about 1 and 4 months of age.

corpus callosum The structure that connects the right and left hemispheres of the cerebral cortex.

correlation A statistic used to describe the strength of a relationship between two variables. It can range from -1.00 to $+1.00$. The closer it is to $+1.00$ or -1.00, the stronger the relationship being described.

creative intelligence One of three types of intelligence described by Sternberg in his triarchic theory of intelligence; includes insightfulness and the ability to see new relationships among events or experiences.

creativity The ability to produce original, appropriate, and valuable ideas and/or solutions to problems.

critical period Any time period during development when an organism is especially responsive to and learns from a specific type of stimulation. The same stimulation at other points in development has little or no effect.

cross-cultural research Any study that involves comparisons of different cultures or contexts.

cross-sectional design A form of research study in which samples of participants from several different age groups are studied at the same time.

crowd A larger and looser group of friends than a clique, normally made up of several cliques that have joined together; a reputation-based group, common in adolescent subculture, with widely agreed-upon characteristics.

cumulative deficit Any difference between groups in IQ or achievement test scores that becomes larger over time.

decentration Thinking that takes multiple variables into account.

deductive logic Reasoning from the general to the particular, from a rule to an expected instance or from a theory to a hypothesis, characteristic of formal operational thinking.

delinquency A subcategory of conduct disorder involving explicit lawbreaking.

dendrites Branchlike protrusions from the cell bodies of neurons.

deoxyribonucleic acid (DNA) The chemical of which chromosomes are composed.

dependent variable The variable in an experiment that is expected to show the impact of manipulations of the independent variable; also called the outcome variable.

depression A combination of sad mood and difficulty carrying out daily functions.

developmental approach An approach to early childhood education that supports children's development of naturally occurring milestones.

developmental psychopathology A relatively new approach to the study of deviance that emphasizes that normal and abnormal development have common roots and that pathology can arise from many different pathways.

developmental science The study of age-related changes in behavior, thinking, emotions, and social relationships.

developmental theories Sets of statements that propose general principles of development.

developmentally appropriate practices Early childhood education practices based on an understanding of developmental universals, individual differences, and contextual variables.

difficult child An infant who is irritable and irregular in behavior.

dilation A key process in the first stage of childbirth, during which the cervix widens sufficiently to allow the infant's head to pass into the birth canal. Full dilation is 10 centimeters.

divergent thinking The ability to produce multiple solutions to problems that have no clear answer.

dominant/recessive pattern of inheritance The pattern of genetic transmission in which a single dominant gene influences a person's phenotype, but an individual must have two recessive genes to express a recessive trait.

Down syndrome (trisomy 21) A genetic anomaly in which every cell contains three copies of chromosome 21 rather than two. Children born with this genetic pattern have characteristic physical features and usually have mental retardation.

dynamic systems theory The view that several factors interact to influence development.

early childhood education Educational programs for children between birth and 8 years.

easy child An infant who adapts easily to change and who exhibits regular patterns of eating, sleeping, and alertness.

eclecticism The use of multiple theoretical perspectives to explain and study human development.

effacement The flattening of the cervix, which, along with dilation, is a key process of the first stage of childbirth.

ego In Freudian theory, the portion of the personality that organizes, plans, and keeps the person in touch with reality. Language and thought are both ego functions.

ego ideal The list of 'dos' in the superego; violation of any of these leads to feelings of shame.

egocentrism A cognitive state in which the individual (typically a child) sees the world only from his own perspective, without awareness that there are other perspectives.

embryo The name given to the developing organism during the period of prenatal development between about 2 weeks and 8 weeks after conception, beginning with implantation of the blastocyst in the uterine wall.

embryonic stage The second stage of prenatal development, from week 2 through week 8, when the embryo's organs form.

empathy As defined by Hoffman, 'a vicarious affective response that does not necessarily match another's affective state but is more appropriate to the other's situation than to one's own' (1982, p. 285).

empiricism The view that perceptual abilities are learned.

endocrine glands Glands (including the adrenals, the thyroid, the pituitary, the testes, and the ovaries) that secrete hormones governing overall physical growth and sexual maturing.

English-as-a-second-language (ESL) An alternative to bilingual education; children who are not proficient in English attend academic classes taught entirely in English but then spend several hours in a separate class to receive English-language instruction.

English-language learners (ELLs) School children who do not speak English well enough to function in English-only classes.

equilibration The third part of the adaptation process proposed by Piaget, involving a periodic restructuring of schemes to create a balance between assimilation and accommodation.

ethnic group A subgroup whose members are perceived by themselves and others to have a common origin and culture, and shared activities in which the common origin or culture is an essential ingredient' (Porter & Washington, 1993, p. 140).

ethnicity An individual's membership in an ethnic group.

excessive weight gain A pattern in which children gain more weight in a year than is appropriate for their age height, and sex.

executive processes Cognitive skills that allow a person to devise and carry out alternative strategies for remembering and solving problems.

experiment A research method for testing a causal hypothesis, in which participants are assigned randomly to experimental and control groups and the experimental group is then provided with a particular experience that is expected to alter behavior in some fashion.

experimental group A group of participants in an experiment who receive a particular treatment intended to produce some specific effect.

expressive language Sounds, signs, or symbols used to communicate meaning.

extended family A family structure that includes parents, grandparents, aunts, uncles, cousins, and so on.

externalizing problems A category of psychopathologies that includes any deviant behavior primarily directed toward others, such as conduct disorders.

extraversion One of the Big Five personality traits; a person who scores high on this trait is characterized by assertiveness, energy, enthusiasm, and outgoingness.

extremely low birth weight (ELBW) Term for any baby born with a weight below 1,000 grams (2.2 pounds).

fallopian tube The tube between the ovary and the uterus down which the ovum travels to the uterus and in which conception usually occurs.

false belief principle The understanding that another person might have a false belief and the ability to determine what information might cause the false belief. A child's understanding of the false belief principle is one key sign of the emergence of a representational theory of mind.

family structure The configuration of individuals in a child's household.

family systems theory The view that the family is an integrated network of factors that work together to influence a child's development.

fast-mapping The ability to categorically link new words to real-world referents.

feminine One of four sex-role types suggested by the work of Bem and others; a type characterized by high scores on femininity measures and low scores on masculinity measures.

fetal alcohol syndrome (FAS) A pattern of abnormalities, including mental retardation and minor physical anomalies, often found in children born to alcoholic mothers.

fetal stage The third stage of prenatal development, from week 8 to birth, when growth and organ refinement take place.

fetus The name given to the developing organism from about 8 weeks after conception until birth.

figurative schemes Mental representations of the basic properties of objects in the world.

fontanel One of several 'soft spots' in the skull that are present at birth but disappear when the bones of the skull grow together.

foreclosure One of four identity statuses proposed by Marcia, involving an ideological or occupational commitment without a previous reevaluation.

formal operations stage Piaget's name for the fourth and final major stage of cognitive development, occurring during adolescence, when the child becomes able to manipulate and organize ideas or hypothetical situations as well as objects.

fraternal (dizygotic) twins Children carried in the same pregnancy but who develop from two separately fertilized ova. They are no more alike genetically than other pairs of siblings.

full scale IQ The WISC-IV score that takes into account verbal and nonverbal scale scores.

gametes Sperm and ova. These cells, unlike all other cells of the body, contain only 23 chromosomes rather than 23 pairs.

gender concept The full understanding that gender is constant and permanent, unchanged by appearance.

gender constancy The final stage in development of gender concept, in which the child understands that gender doesn't change even though there may be external changes (in clothing or hair length, for example).

gender identity The first stage in the development of gender concept, in which a child labels self and others correctly as male or female.

gender schema theory A theory of the development of gender concept and sex-role behavior that proposes that, between about 18 months and age 2 or 3, a child creates a fundamental schema by which to categorize people, objects, activities, and qualities by gender.

gender stability The second stage in the development of gender concept, in which the child understands that a person's gender stays the same throughout life.

gene A uniquely coded segment of DNA in a chromosome that affects one or more specific body processes or developments.

genotype The pattern of characteristics and developmental sequences mapped in the genes of any specific individual, which will be modified by individual experience into the phenotype.

germinal stage The first stage of prenatal development, beginning at conception and ending at implantation of the zygote in the uterus (approximately the first two weeks).

glial cells The 'glue' that holds neurons together to give form to the structures of the nervous system.

goal-corrected partnership Term used by Bowlby to describe the form of the child-parent attachment in the preschool years, in which the two partners, through improved communication, negotiate the form and frequency of contact between them.

gonadotrophic hormones Hormones secreted by the pituitary gland at the beginning of puberty that stimulate the development of glands in the testes and ovaries, which then begin to secrete testosterone or estrogen.

goodness-of-fit The degree to which an infant's environment and his or her temperament work together.

growth curve The pattern and rate of growth exhibited by a child over time.

habituation An automatic decrease in the intensity of a response to a repeated stimulus, enabling a child or adult to ignore the familiar and focus attention on the novel.

handedness A strong preference for using primarily one hand or the other; it develops between 3 and 5 years of age.

hedonistic reasoning A form of prosocial moral reasoning described by Eisenberg in which the child is concerned with consequences to self rather than moral considerations, roughly equivalent to Kohlberg's stage 2.

heterozygous Term describing the genetic pattern when the two genes in the pair at any given genetic locus carry different instructions, such as a gene for blue eyes from one parent and a gene for brown eyes from the other parent.

hippocampus A brain structure that is involved in the transfer of information to long-term memory.

holophrase A combination of a gesture and a single word that conveys more meaning than just the word alone; often seen and heard in children between 12 and 18 months old.

homozygous Term describing the genetic pattern when the two genes in the pair at any given genetic locus both carry the same instructions.

horizontal decalage Piaget's term for school-aged children's inconsistent performance on concrete operations tasks.

hostile aggression Aggressive verbal behavior intended to hurt another's feelings.

hypothesis A testable prediction based on a theory.

hypothetico-deductive reasoning Piaget's term for the form of reasoning that is part of formal operational thought and involves not just deductive logic but also the ability to consider hypotheses and hypothetical possibilities.

id In Freudian theory, the inborn, primitive portion of the personality, the storehouse of libido, the basic energy that continually pushes for immediate gratification.

identical (monozygotic) twins Children carried in the same pregnancy who develop from the same fertilized ovum. They are genetic clones of each other.

identity achievement One of four identity statuses proposed by Marcia, involving the successful resolution of an identity 'crisis' and resulting in a new commitment.

identity diffusion One of four identity statuses proposed by Marcia, involving neither a current reevaluation of identity nor a firm personal commitment.

identity versus role confusion As hypothesized by Erikson, the psychosocial stage in which a teen must develop a sense of personal identity or else enter adulthood with a sense of confusion about his or her place in the world.

inclusive education General term for education programs that assign children with physical, mental, or emotional disabilities to regular classrooms and that provide any special services required by the child in that classroom.

individuation The process of psychological, social, and physical separation from parents that begins in adolescence.

inductive logic Reasoning from the particular to the general, from experience to broad rules, characteristic of concrete operational thinking.

infant directed speech (IDS) The simplified, higher-pitched speech that adults use with infants and young children.

insecure attachment An internal working model of relationships in which the child does not as readily use the parent as a safe base and is not readily consoled by the parent if upset. Includes three subtypes of attachment: avoidant, ambivalent, and disorganized/disoriented.

instrumental aggression Aggressive behavior intended to achieve a goal, such as obtaining a toy from another child.

intelligence A set of abilities defined in various ways by different psychologists but generally agreed to include the ability to reason abstractly, the ability to profit from experience, and the ability to adapt to varying environmental contexts.

intelligence quotient (IQ) Originally defined in terms of a child's mental age and chronological age, IQ is now computed by comparing a child's performance with that of other children of the same chronological age.

intermodal perception Formation of a single perception of a stimulus that is based on information from two or more senses.

internal models of experience A theoretical concept emphasizing that each child creates a set of core ideas or assumptions about the world, the self, and relationships with others through which all subsequent experience is filtered.

internal working model As applied to social relationships, a cognitive construction of the workings of relationships, such as expectations of support or affection, trustworthiness, and so on. The earliest relationships may form the template for such a cognitive construction.

internalizing problems A category of psychopathologies that includes anxiety and depression and other conditions in which deviant behavior is directed inwardly, against the self.

invented spelling A strategy young children with good phonological awareness skills use when they write.

lateralization The process through which brain functions are divided between the two hemispheres of the cerebral cortex.

learning Change due to experience.

learning disability (LD) A term broadly used to describe an unexpected or unexplained problem in learning to read, spell, or calculate and more precisely used to refer to a neurological dysfunction that causes such effects.

learning theories Psychological theories that explain development in terms of accumulated learning experiences.

libido The term used by Freud to describe the basic, unconscious, instinctual sexual energy in each individual.

longitudinal design A form of research study in which the same participants are observed or assessed repeatedly over a period of months or years.

low birth weight (LBW) Term for any baby born with a weight below 2,500 grams (5.5 pounds), including both those born too early (preterm) and those who are small for date.

masculine One of four sex-role types suggested by the work of Bem and others; a type characterized by high scores on masculinity measures and low scores on femininity measures.

maturation Sequential patterns of change that are governed by instructions contained in the genetic code and shared by all members of a species.

mean length of utterance (MLU) The average number of meaningful units in a sentence. Each basic word is one meaningful unit, as is each inflection.

medulla A portion of the brain that lies immediately above the spinal cord; it is largely developed at birth.

memory strategies Ways of manipulating information that increase the chances that it will be remembered.

menarche Onset of menstruation.

mental age Term used by Binet and Simon and Terman in the early calculation of IQ scores to refer to the age level of IQ test items a child could successfully answer. Used in combination with the child's chronological age to calculate an IQ score.

mental retardation An intellectual disability defined most often as an IQ below 70 combined with poor adaptive behavior.

metacognition General and rather loosely used term describing knowledge of one's own thinking processes: knowing what one knows, and how one learns.

metamemory Knowledge about one's own memory processes.

midbrain A section of the brain lying above the medulla and below the cortex that regulates attention, sleeping, waking, and other automatic functions; it is largely developed at birth.

mirror neurons Specialized cells in the cerebral cortex that simulate the behavior and emotions of others.

moral development The process of learning to distinguish between right and wrong in accordance with cultural values.

moral realism stage The first of Piaget's stages of moral development, in which children believe that rules are inflexible.

moral relativism stage The second of Piaget's stages of moral development, in which children understand that many rules can be changed through social agreement.

moral rules As defined by Turiel, universal and obligatory rules reflecting basic principles that guarantee the rights of others.

moratorium One of four identity statuses proposed by Marcia, involving an ongoing reexamination of identity but no new commitment.

Moro reflex The reflex that causes infants to extend their legs, arms, and fingers, arch the back, and draw back the head when startled (for example, by a loud sound or a sensation of being dropped).

motor development Growth and change in ability to perform both gross motor skills (such as walking or throwing) and fine motor skills (such as drawing or writing).

multifactorial pattern of inheritance The pattern of genetic transmission in which both genes and environment influence the phenotype.

multiple intelligences Eight types of intelligence (linguistic, logical/mathematical, spatial, bodily kinesthetic, musical, interpersonal, intrapersonal, and naturalistic) proposed by Howard Gardner.

myelination The process by which an insulating layer of a substance called myelin is added to neurons.

nativism The view that perceptual abilities are inborn.

naturalistic observation A research method in which participants are observed in their normal environments.

needs-oriented reasoning A form of prosocial moral reasoning proposed by Eisenberg in which the child expresses concern directly for the other person's need, even if the other's need conflicts with the child's own wishes or desires.

negative reinforcement The process of strengthening a behavior by the removal or cessation of an unpleasant stimulus.

neglected children Children who are seldom described by peers as either liked or disliked.

neglecting style A fourth parenting style suggested by Maccoby and Martin, involving low levels of both acceptance and control.

neo-Piagetian theory A theory of cognitive development that assumes that Piaget's basic ideas are correct but that uses concepts from information-processing theory to explain children's movement from one stage to the next.

neuronal migration The movement of neurons to specialized regions of the brain.

neuronal proliferation The rapid development of neurons between the 10th and 18th week of gestation.

neurons The cells in the nervous system that are responsible for transmission and reception of nerve impulses.

neuroticism One of the Big Five personality traits; a person who scores high on this trait is characterized by anxiety, self-pity, tenseness, and emotional instability.

neurotransmitters Chemicals that accomplish the transmission of signals from one neuron to another at synapses.

nonnormative changes (individual differences) Changes that result from unique, unshared events.

nonshared environment Characteristics of a family that affect one child but not others in the household.

normative age-graded changes Changes that are common to every member of a species.

normative history-graded changes Changes that occur in most members of a cohort as a result of factors at work during a specific, well-defined historical period.

norms Average ages at which developmental events happen.

obese Describes a child whose BMI falls above the 95th percentile (the top 5%).

object constancy The general phrase describing the ability to see objects as remaining the same despite changes in sensory information about them.

object permanence The understanding that objects continue to exist even when they cannot be directly perceived.

objective self The component of the self-concept that involves awareness of the self as an object with properties.

Oedipus conflict The pattern of events that Freud believed occur between ages 3 and 5, when the child experiences a sexual desire for the parent of the opposite sex; the resulting fear of possible

reprisal from the parent of the same sex is resolved when the child identifies with that parent.

openness/intellect One of the Big Five personality traits; a person who scores high on this trait is characterized by curiosity, imagination, insight, originality, and wide interests.

operant conditioning The type of learning in which the probability of a person's performing some behavior is increased or decreased because of the consequences it produces.

operation Term used by Piaget for a complex, internal, abstract scheme, first seen at about age 6.

operational efficiency A neo-Piagetian term for the number of schemes an individual can place into working memory at one time.

operative schemes Mental representations of the logical connections among objects in the world.

oppositional defiant disorder (ODD) A pattern of negative, defiant, disobedient, and hostile behavior toward parents and other authority figures, established prior to age 8.

organization The process of deriving generalizable schemes from specific experiences.

ossification The process of hardening by which soft tissue becomes bone.

otitis media (OM) An inflammation of the middle ear that is caused by a bacterial infection.

overextension The inappropriate use of a word to designate an entire category of objects, such as when a child uses the word kitty to refer to all animate objects.

overregularization Young children's applications of basic rules to irregular words.

overweight Describes a child whose BMI is at the 95th percentile.

ovum The cell released monthly from a woman's ovaries, which, if fertilized, forms the basis for the developing organism.

parallel play Form of play seen in toddlers, in which children play next to, but not with, one another.

perception The attribution of meaning to sensory information.

perceptual constancies A collection of mental rules that allow humans to perceive shape, size, and color as constant even when perceptual conditions (such as amount of light, angle of view, and the like) change.

perceptual reasoning index Tests on the WISC-IV, such as block design and picture completion, that tap nonverbal visual-processing abilities.

performance The behavior shown by a person under real-life rather than ideal circumstances. Even when researchers are interested in competence, all they can ever measure is performance.

permissive style One of the three parenting styles described by Baumrind, characterized by high levels of nurturance and low levels of control, maturity demands, and communication.

personality The collection of relatively enduring patterns of reacting to and interacting with others and the environment that distinguishes each child or adult.

pervasive developmental disorders (PDDs) A group of disorders in which children exhibit severe disturbances in social relationships.

phenotype The expression of a particular set of genetic information in a specific environment; the observable result of the joint operation of genetic and environmental influences.

phonological awareness Understanding of the rules governing the sounds of a language as well as knowledge of the connection between sounds and the way they are represented in written language.

phonology The sound patterns of a particular language and the rules for combining them.

pituitary gland Gland that provides the trigger for release of hormones from other glands.

placenta An organ that develops between the fetus and the wall of the uterus during gestation.

plasticity The ability of the brain to change in response to experience.

polygenic pattern of inheritance Any pattern of genetic transmission in which multiple genes contribute to the outcome, such as is presumed to occur for complex traits such as intelligence or temperament.

popular children Children who are described as well-liked by a majority of peers.

positive reinforcement The process of strengthening a behavior by the presentation of some pleasurable or positive stimulus.

practical intelligence One of three types of intelligence in Sternberg's triarchic theory of intelligence; often called 'street smarts,' this type of intelligence includes skill in applying information to the real world or solving practical problems.

pragmatics The rules for the use of language in communicative interaction, such as the rules for taking turns and the style of speech that is appropriate for different listeners.

preconventional morality The first level of moral development proposed by Kohlberg, in which moral judgments are dominated by consideration of what will be punished and what feels good.

prefrontal cortex (PFC) The part of the frontal lobe just behind the forehead that is responsible for executive processing.

prelinguistic phase The period before a child speaks his or her first words.

preoperational stage Piaget's term for the second major stage of cognitive development, from about 24 months to about age 6, marked by the ability to use symbols.

preterm infant An infant born before 38 weeks gestational age.

primary circular reactions Piaget's phrase to describe a baby's simple repetitive actions in substage 2 of the sensorimotor stage, organized around the baby's own body; the baby repeats some action in order to have some desired outcome occur again, such as putting his thumb in his mouth to repeat the good feeling of sucking.

primitive reflexes Collection of reflexes seen in young infants that gradually disappear during the first year of life, including the Moro and Babinski reflexes.

principle of contrast The assumption that every word has a different meaning, which leads a child to assume that two or more different words refer to different objects.

principled (postconventional) morality The third level of moral development proposed by Kohlberg, in which considerations of justice, individual rights, and social contracts dominate moral judgment.

processing speed index Timed tests on the WISC-IV, such as symbol search, that measure how rapidly an examinee processes information.

production deficiency A pattern whereby an individual can use some mental strategy if reminded to do so but fails to use the strategy spontaneously.

prosocial behavior Voluntary behavior intended to benefit another, such as giving away or sharing possessions, money, or time, with no obvious self-gain; altruism.

proximodistal One of two basic patterns of physical development in infancy (the other is cephalocaudal), in which development proceeds from the center outward'—that is, from the trunk to the limbs.

pruning The process of eliminating unused synapses.

psychoanalytic theories Developmental theories based on the assumption that age-related change results from maturationally determined conflicts between internal drives and society's demands.

psychological disorder A pattern of behavior that is unusual in a person's culture and interferes with his or her psychological, social, and/or educational functioning.

psychosexual stages The stages of personality development suggested by Freud: the oral, anal, phallic, latency, and genital stages.

psychosocial stages The stages of personality development suggested by Erikson, involving tasks centered on trust, autonomy, initiative, industry, identity, intimacy, generativity, and ego integrity.

puberty The series of hormonal and physical changes at adolescence that bring about sexual maturity.

punishment The removal of a desirable stimulus or the administration of an unpleasant consequence after some undesired behavior in order to stop the behavior.

reaction range Term used by some psychologists for the range of possible outcomes (phenotypes) for some variable, given basic genetic patterning (the genotype). In the case of IQ scores, the reaction range is estimated at 20 to 25 points.

receptive language Comprehension of spoken language.

reciprocal determinism Bandura's model in which personal, behavioral, and environmental factors interact to influence personality development.

reciprocal friendship A friendship in which each partner identifies the other as a friend; also, a quality of friendship in school-aged children, when friendship is for the first time perceived as being based on reciprocal trust.

reflexes Automatic body reactions to specific stimulation, such as the knee jerk or the Moro reflex. Adults have many reflexes, but the newborn also has some primitive reflexes that disappear as the cortex develops.

rejected children Unpopular children who are explicitly avoided and not chosen as playmates or friends.

relational aggression Aggression aimed at damaging another person's self-esteem or peer relationships, such as by using ostracism or threats of ostracism, cruel gossiping, or facial expressions of disdain.

relational complexity The number of elements in a problem and the complexity of the relationships among the elements.

relative right-left orientation The ability to identify right and left from multiple perspectives.

reliability The stability of a test score over multiple testing sessions.

respiratory distress syndrome A problem frequently found in infants born more than 6 weeks before term, in which the infant's lungs lack a chemical (surfactant) needed to keep air sacs inflated.

response inhibition The ability to control responses to stimuli.

responsiveness An aspect of parent-child interaction; a responsive parent is sensitive to the child's cues and reacts appropriately, following the child's lead.

reticular formation The part of the brain that regulates attention.

reversibility One of the most critical of the operations Piaget identified as part of the concrete operations period: the understanding that actions and mental operations can be reversed.

role-taking The ability to look at a situation from another person's perspective.

rooting reflex The reflex that causes an infant to automatically turn toward a touch on the cheek, open the mouth, and make sucking movements.

scaffolding The term used by Bruner to describe the process by which a teacher (or parent, older child, or other person in the role of teacher) structures a learning encounter with a child, so as to lead the child from step to step'—a process consistent with Vygotsky's theory of cognitive development.

schematic learning The development of expectancies concerning what actions lead to what results or what events tend to go together.

scheme Piaget's word for the basic actions of knowing, including both physical actions (sensorimotor schemes, such as looking or reaching) and mental actions (such as classifying, comparing, and reversing). An experience is assimilated into a scheme, and the scheme is created or modified through accommodation.

secondary circular reactions Repetitive actions in substage 3 of the sensorimotor period, oriented around external objects; the infant repeats some action in order to have some outside event recur, such as hitting a mobile repeatedly so that it moves.

secular trend A pattern of change in some characteristic over several cohorts, such as systematic changes in the average timing of menarche or in average height or weight.

secure attachment An internal working model of relationships in which the child uses the parent as a safe base and is readily consoled after separation, when fearful, or when otherwise stressed.

selective attention The ability to focus cognitive activity on the important elements of a problem or situation.

self-concept One's knowledge of and thoughts about the set of qualities attributed to the self.

self-efficacy Bandura's term for an individual's belief in his or her ability to accomplish tasks.

self-esteem A global evaluation of one's own worth; an aspect of self-concept.

semantics A particular language's system of meaning and the rules for conveying meaning.

sensation The process of taking in raw information through the senses.

sensation-seeking A strong desire to experience the emotional and physical arousal associated with risky behaviors such as fast driving and unprotected sex.

sensitive period A period during which particular experiences can best contribute to proper development. It is similar to a critical period, but the effects of deprivation during a sensitive period are not as severe as during a critical period.

sensorimotor stage Piaget's term for the first major stage of cognitive development, from birth to about 24 months, when the child uses sensory and motor skills to act on the environment.

sequential design A form of research study that combines cross-sectional and longitudinal designs in some way.

seriation The ability to use a rule to put an array of objects in order.

severely obese Describes a child whose BMI-for-age is above the 99th percentile.

sex role The set of behaviors, attitudes, rights, duties, and obligations that are seen as appropriate for being male or female in any given culture.

sex-typed behavior Behavior that matches a culturally defined sex role.

sexually transmitted diseases (STDs) Category of disease spread by sexual contact, including chlamydia, genital warts, syphilis, gonorrhea, and HIV; also called venereal diseases.

shape constancy The ability to see an object's shape as remaining the same despite changes in the shape of the retinal image; a basic perceptual constancy.

shared environment Characteristics of a family that affect all children in the household.

short-term storage space (STSS) A neo-Piagetian term for working memory capacity.

size constancy The ability to see an object's size as remaining the same despite changes in size of the retinal image; a key element in size constancy is the ability to judge depth.

slow-to-warm-up child An infant who may seem unresponsive but who simply takes more time to respond than other infants do.

small-for-date infant An infant who weighs less than is normal for the number of weeks of gestation completed.

social cognition Thinking about and understanding the emotions of and interactions and relationships among people.

social referencing Using another person's emotional reaction to some situation as a basis for deciding one's own reaction. A baby does this when she checks her parent's facial expression or body language before responding positively or negatively to something new.

social status A term used by psychologists to refer to how well an individual child is liked by his or her peers.

socioeconomic status (SES) A collective term that includes the economic, occupational, and educational factors that influence a family's relative position in society.

spatial cognition The ability to infer rules from and make predictions about the movement of objects in space.

spatial perception The ability to identify and act on relationships of objects in space; in most people, this skill is lateralized to the right cerebral hemisphere.

sperm The cells produced in a man's testes that may fertilize an ovum following intercourse.

Stanford-Binet The best-known U.S. intelligence test. It was written by Lewis Terman and his associates at Stanford University and based on the first tests by Binet and Simon.

states of consciousness The periodic shifts in alertness, sleepiness, crankiness, and so on that characterize an infant's behavior.

Strange Situation A series of episodes used by Mary Ainsworth and others in studies of attachment. The child is observed with the mother, with a stranger, alone, when reunited with the stranger, and when reunited with the mother.

structured immersion An alternative to traditional bilingual education used in classrooms in which all children speak the same non-English native language. All basic instruction is in English, paced so that the children can comprehend, with the teacher translating only when absolutely necessary.

subjective self The component of the self-concept that involves awareness of the 'I,' the self that is separate from others.

submersion An approach to education of non-English–speaking students in which they are assigned to a classroom where instruction is given in English and are given no supplemental language assistance; also known as the 'sink or swim' approach.

sudden infant death syndrome (SIDS) The unexpected death of an infant who otherwise appears healthy; also called crib death. The cause of SIDS is unknown.

superego In Freudian theory, the 'conscience' part of personality, which contains parental and societal values and attitudes incorporated during childhood.

synapses Tiny spaces across which neural impulses flow from one neuron to the next.

synaptogenesis The process of synapse formation.

syntax The rules for forming sentences in a particular language.

systematic and explicit phonics Planned, specific instruction in sound-letter correspondences.

task goal A goal orientation associated with a desire for self-improvement.

telegraphic speech Term used by Roger Brown to describe the earliest sentences created by most children, which sound a bit like telegrams because they include key nouns and verbs but generally omit all other words and grammatical inflections.

temperament Inborn predispositions that form the foundations of personality.

teratogens Substances such as viruses and drugs or events that can cause birth defects.

tertiary circular reactions The deliberate experimentation with variations of previous actions, characteristic of substage 5 of the sensorimotor period, according to Piaget.

theory of mind Ideas that collectively explain other people's ideas, beliefs, desires, and behavior.

tracking Following a moving object with the eyes.

transitivity The ability to make inferences about logical relationships in an ordered set of stimuli.

triarchic theory of intelligence A theory advanced by Robert Sternberg, proposing the existence of three types of intelligence: analytical, creative, and practical.

umbilical cord The cord connecting the embryo/fetus to the placenta, containing two arteries and one vein.

underextension The use of words to apply only to specific objects, such as a child's use of the word cup to refer only to one particular cup.

undifferentiated One of four sex-role types suggested by the work of Bem and others; a type characterized by low scores on both masculinity and femininity measures.

uterus The female organ in which the embryo/fetus develops (popularly referred to as the womb).

utilization deficiency Using some specific mental strategy without deriving benefit from it.

validity The degree to which a test measures what it is intended to measure.

verbal comprehension index Tests on the WISC-IV that tap verbal skills such as knowledge of vocabulary and general information.

very low birth weight (VLBW) Term for any baby born with a weight below 1,500 grams (3.3 pounds).

viability The fetus's capacity for survival outside the womb.

visual acuity How well one can see.

warmth versus hostility The key dimension of emotional tone used to describe family interactions.

whole language approach An approach to reading instruction that places more emphasis on the meaning of written language than on its structure.

WISC-IV The most recent revision of the Wechsler Intelligence Scales for Children, a well-known IQ test developed in the United States that includes both verbal and performance (nonverbal) subtests.

working memory index Tests on the WISC-IV, such as digit span, that measure working memory efficiency.

WPPSI-III The third revision of the Wechsler Preschool and Primary Scale of Intelligence.

zone of proximal development In Vygotsky's theory, the range of tasks that are slightly too difficult for a child to do alone but that can be accomplished successfully with guidance from an adult or more experienced child.

zygote The single cell formed from separate sperm and egg cells at conception.

Basic Issues in the Study of Development

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LEARNING OBJECTIVES

Issues in the Study of Development

- **1** What answers have been proposed to the nature-nurture and continuity-discontinuity questions?
- **2** What are the internal and external variables that influence development?
- **3** How does the ecological perspective improve scientists' understanding of child development?
- **4** In what ways do the concepts of vulnerability and resilience help us better understand child development?
- **5** How do the three kinds of age-related change differ?
  - **5a** How is the availability of health information on the Internet likely to affect today's cohort of children?

Theories of Development

- **6** What are the main ideas of the psychoanalytic theories?
- **7** What are the main ideas of cognitive-developmental and information-processing theories?
- **8** How do learning theorists explain development?
  - **8a** How do psychologists help children overcome school refusal?
- **9** What are the criteria that developmental scientists use to compare theories?

Finding the Answers: Research Designs and Methods

- **10** What are the goals of developmental science?
- **11** What are the pros and cons of cross-sectional, longitudinal, and sequential research designs?
- **12** What descriptive methods are used by developmental scientists?
- **13** What is the primary advantage of the experimental method?
  - **13a** How does critical thinking help you evaluate media reports of research?
- **14** Why is cross-cultural research important to the study of human development?
- **15** What are the ethical standards that developmental researchers must follow?

When it comes to child and adolescent development, you have a great deal of personal experience. For one thing, you had a childhood and an adolescence of your own, and you have had many opportunities to observe children and teens as well as the parents, teachers, and others who are responsible for children's upbringing. Information media such as books, movies, television shows, and the Internet have provided you with additional insights into the trials

developmental science The study of age-related changes in behavior, thinking, emotions, and social relationships.

and tribulations of development that go beyond your own personal experiences. As a result, you have probably formed several beliefs about development that you regard as absolutely true.

Think about what you believe to be true beyond dispute about sibling relationships. Here are a few ideas:

Siblings always fight.
Siblings of the same gender fight more than opposite gender siblings do.
Sibling fights are usually sparked by jealousy—"Mom loves you best."

Watson, J. B. (1930). *Behaviorism*. New York: Norton

You may be so sure that these propositions are true that you will find it shocking that, as the aptly named best-selling book ***Nurture Shock*** (Bronson & Merryman, 2009) pointed out, research does not support any of them. The truth is that the degree of conflict between siblings depends on a lot of factors and, consequently, varies considerably from one family to another. Moreover, brother-brother and sister-sister siblings don't fight any more or less than brother-sister pairs do. And competition for parental affection is rarely the cause of sibling conflict.

Our purpose in drawing attention to sibling relationships here is to spark your curiosity about how well so-called "common sense" thinking about developmental psychology corresponds to the science of developmental psychology.

As you work your way through the chapters of this text, you will no doubt encounter many research findings that will challenge your beliefs. But we want you to keep in mind that the goal of developmental psychologists isn't simply to cause people to question and alter their beliefs. Instead, developmentalists seek to understand the processes that underlie human development and to find ways to help parents, teachers, therapists, and others who work with children do so effectively. To that end, they develop theories and conduct research aimed at describing, explaining, predicting, and influencing development.

Issues in the Study of Development

Centuries before researchers began to use scientific methods to study age-related changes, philosophers proposed explanations of development based on everyday observations. Many of their questions and assertions about the nature of human development continue to be central to modern-day **developmental science**. Watch at MyDevelopmentLab

Watch the Video *So Much to Choose from* at MyDevelopmentLab

Learning Objective 1
What answers have been proposed to the nature-nurture and continuity-discontinuity questions?

Two Key Questions

Two important questions have shaped the scientific study of child development. First, philosophers and scientists alike have debated the degree to which inborn tendencies and environmental factors influence development. Second, there are differing opinions as to whether age-related change occurs in stages.

THE NATURE-NURTURE DEBATE The argument about nature versus nurture, also referred to as heredity versus environment or *nativism* versus *empiricism*, is one of the oldest and most central theoretical issues within both psychology and philosophy. For example, have you ever heard someone say that "baby talk" will interfere with a child's language development? If so, then you have heard an argument for the nurture side of the debate. Such a statement assumes that language development is mostly a matter of imitation: The child must hear language that is properly pronounced and grammatically correct in order to develop linguistic fluency. The nature side would counter that children possess some kind of internal mechanism to ensure that they develop fluent language, no matter how many "goo-goo-ga-gas" they hear from those

around them. "Which side is right?" students invariably ask. If there were a simple answer to that question, the debate would have ceased long ago. Instead, the controversy continues today with regard to many developmental processes, including language development.

Philosophically, the nature side of the controversy was represented by the *idealists* and *rationalists*, principally Plato and René Descartes, both of whom believed that at least some knowledge is inborn. On the other side of the argument were a group of British philosophers called *empiricists*, including John Locke, who insisted that at birth the mind is a blank slate—in Latin, a *tabula rasa*. All knowledge, the empiricists argued, is created by experience. From this perspective, developmental change is the result of external, environmental factors acting on a child whose only relevant internal characteristic is the capacity to respond.

In contrast to both rationalists and empiricists, other philosophers believed that development involved an interaction between internal and external forces. For example, the Christian notion of *original sin* teaches that children are born with a selfish nature and must be spiritually reborn. After rebirth, children have access to the Holy Spirit, which helps them learn to behave morally through parental and church-based instruction in religious practice.

French philosopher Jean-Jacques Rousseau also believed in the idea of interaction between internal and external forces, but he claimed that all human beings are naturally good and seek out experiences that help them grow. For Rousseau, the goal of human development was to achieve one's inborn potential. "Good" developmental outcomes, such as a willingness to share one's possessions with others who are less fortunate, resulted from growing up in an environment that didn't interfere with the child's expression of his own innate characteristics. In contrast, "bad" outcomes, such as aggressive behavior, were learned from others or arose when a child experienced frustration in his efforts to follow the dictates of the innate goodness with which he was born.

The views of two of psychology's pioneers illustrate the way early psychologists approached the nature-nurture issue. G. Stanley Hall (1844–1924) believed that the milestones of childhood were dictated by an inborn developmental plan and were similar to those that had taken place in the evolution of the human species. He thought that developmentalists should identify **norms**, or average ages at which milestones happen. Norms, Hall said, could be used to learn about the evolution of the species as well as to track the development of individual children. So, for Hall, development was mostly about the nature side of the debate.

John Watson explained development in a way that was radically different from that of G. Stanley Hall. In fact, Watson coined a new term, behaviorism, to refer to his point of view (Watson, 1913). **Behaviorism** defines development in terms of behavior changes caused by environmental influences. Watson did not believe in an inborn developmental plan of any sort. Instead, he claimed that, through manipulation of the environment, children could be trained to be or do anything (Jones, 1924; Watson, 1930). As Watson put it,

> *Give me a dozen healthy infants, well-formed, and my own specified world to bring them up in and I'll guarantee to take any one at random and train him to become any type of specialist I might select—doctor, lawyer, merchant, chief, and yes, even beggarman and thief, regardless of his talents, penchants, abilities, vocations, and the race of his ancestors. (1930, p. 104)*

In a famous study known as the "Little Albert" experiment, Watson conditioned a baby to fear white rats (Watson & Rayner, 1920). As the baby played with the rat, Watson made banging sounds that frightened the child. Over time, the baby came to associate the rat with the noises. He cried and tried to escape from the room whenever the rat was present. Based on the Little Albert study and several others, Watson claimed that all age-related changes are the result of learning (Watson, 1928). **Watch** at **MyDevelopmentLab**

STAGES AND SEQUENCES The nature-nurture controversy is not the only "big question" in developmental psychology. An equally central dispute concerns the *continuity-discontinuity issue*: Is a child's expanding ability just "more of the same," or does it reflect a new kind of activity? For example, a 2-year-old is likely to have no individual friends among her playmates, while an 8-year-old is likely to have several. We could think of this as a *quantitative* change (a change in amount) from zero friends to some friends, which suggests that the qualitative aspects of friendship are the same at every age—or,

norms Average ages at which developmental events happen.

behaviorism The theoretical view that defines development in terms of behavior changes caused by environmental influences.

Watch the **Video** *Little Albert* at **MyDevelopmentLab**

John Watson's pioneering research on emotional learning in infants helped psychologists better understand the role of classical conditioning in child development.

© John Watson and infant

(left) © Pablo Paul/Alamy
(right) Quantum/Glowimages

Which photo represents continuous *or* quantitative *change? Which illustrates* discontinuous *or* qualitative *change?*

as developmentalists would express it, changes in friendships are *continuous* in nature. Alternatively, we could think of the difference in friendships from one age to another as a *qualitative* change (a change in kind or type)—from disinterest in peers to interest, or from one sort of peer relationship to another. In other words, in this view, changes in friendships are *discontinuous*, in that each change represents a change in the quality of a child's relationships with peers. Thus, friendships at 2 are quite different from friendships at 8 and differ in ways that cannot be captured by describing them solely in terms of the number of friends a child has.

Of particular significance is the idea that, if development consists only of additions (quantitative change), then the concept of stages is not needed to explain it. However, if development involves reorganization, or the emergence of wholly new strategies, qualities, or skills (qualitative change), then the concept of stages may be useful. Certainly, we hear a lot of "stagelike" language in everyday conversation about children: "He's just in the terrible twos" or "It's only a stage she's going through." Although there is not always agreement on just what would constitute evidence for the existence of discrete stages, the usual description is that a stage shift involves not only a change in skills but some discontinuous change in underlying structure (Lerner, Theokas, & Bobek, 2005). The child in a new stage approaches tasks differently, sees the world differently, is preoccupied with different issues.

Learning Objective 2
What are the internal and external variables that influence development?

Influences on Development

Most modern developmental psychologists agree that essentially every facet of a child's development is a product of some pattern of interaction of nature and nurture (Rutter, 2002). Further, most recognize that some aspects of development are continuous and others are more stagelike. Consequently, the discussions have become a bit more complex.

MATURATION Nature shapes development most clearly through genetic programming that may determine whole sequences of development. Developmentalist Arnold Gesell (1880–1961) used the term **maturation** to describe genetically programmed sequential patterns of change, and this term is still uniformly used today (Gesell, 1925; Thelen & Adolph, 1992). Any maturational pattern is marked by three qualities: It is universal, appearing in all children, across cultural and historical boundaries; it is sequential, involving some pattern of unfolding skill or characteristics; and it is resistant to environmental influence. In its purest form, a maturationally determined developmental sequence occurs regardless of practice or training. You don't have to practice growing pubic hair; you don't

maturation Sequential patterns of change that are governed by instructions contained in the genetic code and shared by all members of a species.

have to be taught how to walk. In fact, only extreme conditions, such as severe malnutrition, prevent such sequences from unfolding. Yet even confirmed maturational theorists agree that experience plays a role.

THE TIMING OF EXPERIENCE Research tells us that specific experience interacts with maturational patterns in intricate ways. For example, Greenough (1991) notes that one of the proteins required for the development of the visual system is controlled by a gene whose action is triggered only by visual experience. Moreover, experience is required to maintain the neural connections underlying vision (Briones, Klintsova, & Greenough, 2004). So some visual experience is needed for the genetic program to operate. The timing of specific experiences may matter as well. The impact of a particular visual experience may be quite different if it occurs at birth than if it occurs when a baby is older.

Developmentalists' thinking about the importance of timing was stimulated, in part, by research on other species that showed that specific experiences had different or stronger effects at some points in development than at others. The most famous example is that baby ducks will become imprinted on (become attached to and follow) any duck or any other quacking, moving object that happens to be around them 15 hours after they hatch. If nothing is moving or quacking at that critical point, they don't become imprinted at all (Hess, 1972). So the period just around 15 hours after hatching is a **critical period** for the duck's development of a proper following response.

In humans, we more often see *sensitive periods* than true critical periods. The difference is that a **sensitive period** is a time when a particular experience can be best incorporated into the maturational process, whereas a critical period is a time when an experience *must* happen or a particular developmental milestone will never occur. For example, infancy and early childhood are sensitive periods for language development. A child who is physically isolated from other humans by an abusive parent during these years will not develop normal language, but she will develop some language function once she is reintegrated into a normal social environment. **Watch** at **MyDevelopmentLab**

INBORN BIASES Another kind of internal influence is described by the concepts of *inborn biases*. For instance, researchers such as Elizabeth Spelke (1991) have concluded that babies come into the world with certain preexisting conceptions about the behavior of objects. Very young babies already seem to understand that unsupported objects will move downward and that a moving object will continue to move in the same direction unless it encounters an obstacle. Theorists do not propose that these built-in response patterns are the end of the story; rather, they see them as the starting point. Development is a result of experience filtered through these initial biases, but those biases constrain the number of developmental pathways that are possible (Cole & Packer, 2011).

BEHAVIOR GENETICS The concept of maturation and the idea of inborn biases are both designed to account for patterns and sequences of development that are the same for all children. At the same time, nature contributes to variations from one individual to the next. The study of genetic contributions to individual behavior, called **behavior genetics**, uses two primary research techniques—the study of identical and fraternal twins and the study of adopted children. If identical twins are more like each other on some dimension than other kinds of siblings are, despite having grown up in different environments, this is rather compelling evidence of a genetic contribution for that trait. In the case of adopted children, the strategy is to compare the degree of similarity between the adopted child and his birth parents (with whom he shares genes but not environment) with the degree of similarity between the adopted child and his adoptive parents (with whom he shares environment but not genes). If the child turns out to be more similar to his birth parents than to his adoptive parents, or if his behavior or skills are better predicted by the characteristics of his birth parents than by characteristics of his adoptive parents, that evidence would again demonstrate the influence of heredity. Behavior geneticists have shown that heredity affects a remarkably broad range of behaviors (Netherlands Twin Register, 2010). These include intellectual as well as social and emotional functioning. Consequently, you will be reading about the results of twin and adoption studies in several future chapters.

critical period Any time period during development when an organism is especially responsive to and learns from a specific type of stimulation. The same stimulation at other points in development has little or no effect.

sensitive period A period during which particular experiences can best contribute to proper development. It is similar to a critical period, but the effects of deprivation during a sensitive period are not as severe as during a critical period.

behavior genetics The study of the genetic contributions to behavior or traits such as intelligence or personality.

Watch the **Video** *Windows of Opportunity for Childhood Development* at **MyDevelopmentLab**

The study of identical twins, like these two girls, is one of the classic methods of behavior genetics. Whenever pairs of identical twins are more like each other in some behavior or quality than are pairs of fraternal twins, a genetic influence is likely at work.

GENE-ENVIRONMENT INTERACTION A child's genetic heritage may also affect his environment (Caspi & Moffitt, 2006), a phenomenon that could occur via two routes. First, the child inherits his genes from his parents, who also create the environment in which he is growing up. So a child's genetic heritage may predict something about his environment. For example, parents who themselves have higher IQ scores are not only likely to pass their "good IQ" genes on to their children, but also likely to create a richer, more stimulating environment for those children. Similarly, children who inherit a tendency toward aggression or hostility from their parents are likely to live in a family environment that is higher in criticism and negativity—because those are expressions of the parents' own genetic tendencies toward aggressiveness or hostility (Reiss, 1998).

Second, each child's unique pattern of inherited qualities affects the way she behaves with other people, which in turn affects the way adults and other children respond to her. A cranky or temperamentally difficult baby may receive fewer smiles and more scolding than a placid, even-tempered one; a genetically brighter child may demand more personal attention, ask more questions, or seek out more complex toys than would a less bright child (Saudino & Plomin, 1997). Furthermore, children's interpretations of their experiences are affected by all their inherited tendencies (Plomin, Reiss, Hetherington, & Howe, 1994).

INTERNAL MODELS OF EXPERIENCE Although we often associate experience exclusively with external forces, it's just as important to consider each individual's view of his or her experiences—in other words, the internal aspect of experience. For instance, suppose a friend says to you, "Your new haircut looks great. I think it's a lot more becoming when it's short like that." Your friend intends it as a compliment, but what determines your reaction is how you hear the comment, not what is intended. If your internal model of your self includes the basic idea "I usually look okay," you will likely hear your friend's comment as a compliment; but if your internal model of self or relationships includes some more negative elements, such as "I usually do things wrong, so other people criticize me," then you may hear an implied criticism in your friend's comment ("Your hair used to look awful").

Theorists who emphasize the importance of such meaning systems argue that each child creates a set of **internal models of experience**—a set of core ideas or assumptions about the world, about himself, and about relationships with others—through which all subsequent experience is filtered (Epstein, 1991; Reiss, 1998). Such assumptions are certainly based in part on actual experiences, but once they are formed into an internal model, they generalize beyond the original experience and affect the way the child interprets future experiences. A child who expects adults to be reliable and affectionate will be more likely to interpret the behavior of new adults in this way and will create friendly and affectionate relationships with others outside of the family. A child's self-concept seems to operate in much the same way, as an internal working model of "who I am" (Bretherton, 1991). This self-model is based on experience, but it also shapes future experience.

internal models of experience
A theoretical concept emphasizing that each child creates a set of core ideas or assumptions about the world, the self, and relationships with others through which all subsequent experience is filtered.

ASLIN'S MODEL OF ENVIRONMENTAL INFLUENCE Theoretical models are useful for organizing ideas about how all these factors interact to influence development. One particularly good example of a theoretical approach that attempts to explain environmental influences is a set of models summarized by Richard Aslin (1981), based on earlier work by Gottlieb (1976a, 1976b) and shown schematically in Figure 1. Aslin and his colleagues have used these models to study infants' perception of speech and objects (e.g., Aslin, 2011; Maye, Weiss, & Aslin, 2008). In each drawing the dashed line represents the path of development of some skill or behavior that would occur without a particular experience; the solid line represents the path of development if the experience were added.

For comparison purposes, the first of the five models shows a maturational pattern with no environmental effect. The second model, which Aslin calls *maintenance*, describes a pattern in which some environmental input is necessary to sustain a skill or behavior that has already developed maturationally. For example, kittens are born with full binocular vision, but if you

cover one of their eyes for a period of time, their binocular skill declines.

The third model shows a *facilitation* effect of the environment, in which a skill or behavior develops earlier than it normally would because of some experience. For example, children whose parents talk to them more often in the first 18 to 24 months of life, using more complex sentences, appear to develop two-word sentences and other early grammatical forms somewhat earlier than do children who are talked to less. Yet less-talked-to children do eventually learn to create complex sentences and use most grammatical forms correctly, so the experience of being talked to more provides no permanent gain.

When a particular experience does lead to a permanent gain, or an enduringly higher level of performance, Aslin calls the model *attunement*. For example, children from poverty-level families who attend special enriched child care in infancy and early childhood have consistently higher IQ scores throughout childhood than do children from the same kinds of families who do not have such enriched experience (Ramey & Ramey, 2004). Aslin's final model, *induction*, describes a pure environmental effect: In the absence of some experience, a particular behavior does not develop at all. Giving a child tennis lessons or exposing him to a second language falls into this category of experience.

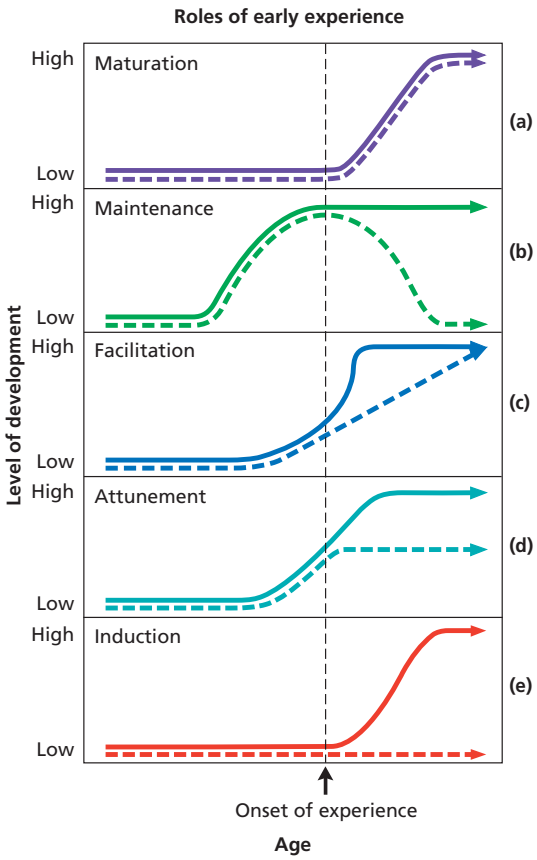

FIGURE 1 Aslin's Models of Environmental Influence
Aslin proposed five models of possible relationships between maturation and environment. The top model shows a purely maturational effect; the bottom model (induction) shows a purely environmental effect. The other three show interactive combinations: maintenance, in which experience prevents the deterioration of a maturationally developed skill; facilitation, in which experience speeds up the development of some maturational process; and attunement, in which experience increases the ultimate level of some skill or behavior above the "normal" maturational level.

(*Source:* Aslin, Richard N. "Experiential Influences and Sensitive Periods in Perceptual Development," *Development of perception. Psychobiological perspectives: Vol. 2. The visual system* (1981), p. 50. Reprinted by permission of Elsevier Science and the author.)

The Ecological Perspective and the Cultural Context of Development

Learning Objective 3
How does the ecological perspective improve scientists' understanding of child development?

Until quite recently, most research on environmental influences focused on a child's family (frequently only the child's mother) and on the stimulation available in the child's home, such as the kinds of toys or books available to the child. If psychologists looked at a larger family context at all, it was usually only in terms of the family's economic status—its level of wealth or poverty. Since the early 1980s, however, there has been a strong push to widen the scope of research, to consider the *ecology*, or *context*, in which each child develops. The late Urie Bronfenbrenner (1917–2005), one of the key figures in this area of study (1979, 1989), emphasizes that each child grows up in a complex social environment (a social ecology) with a distinct cast of characters: siblings, parents, grandparents, baby-sitters, pets, teachers, friends. And this cast is itself embedded within a larger social system: The parents have jobs that they may like or dislike; they may or may not have close and supportive friends; they may be living in a safe neighborhood or one full of dangers; the local school may be excellent or poor; and the parents may have good or poor relationships with the school. Bronfenbrenner's argument is that researchers not only must include descriptions of these more extended aspects of the environment but must also consider the ways in which all the components of this complex system interact with one another to affect the development of an individual child.

One aspect of such a larger ecology is the still broader concept of *culture*, a system of meanings and customs, including values, attitudes, goals, laws, beliefs, morals, and physical artifacts of