Nature and Nurture

In the study of development, nature refers to the inherited (genetic) characteristics and tendencies that influence development. Some inherited characteristics appear in virtually everyone. For instance, almost all children have the capacity to learn to walk, understand language, imitate others, use simple tools, and draw inferences about how other people view the world. Thus all children have a set of universal human genes that, when coupled with a reasonable environment, permit them to develop as reasonably capable members of the human species.

Other kinds of genes create differences among people. Children's stature, eye color, and facial appearance are largely determined by genes. Children's temperament—their characteristic ways of responding to emotional events, novel stimuli, and their own impulses—seems to be in part affected by their individual genetic makeup (Rothbart, Ahadi, & Evans, 2000; D. C. Rowe, Almeida, & Jacobson, 1999). Similarly, being slow or quick to learn from instruction and everyday experiences has some genetic basis (Petrill & Wilkerson, 2000; Plomin, 1989).

Inherited characteristics and tendencies are not always evident at birth. Many physical features emerge gradually through the process of maturation, the genetically guided changes that occur over the course of development. Environmental support, such as food, reasonably safe and toxin-free surroundings, and responsive care from others, is necessary for maturation to take place; nature never works alone.

Thus nature's partner is nurture, the environmental conditions that influence development. Children's experiences in the environment affect all aspects of their being, from the health of their bodies to the curiosity of their minds. Nurture affects children's development through multiple channels: physically through nutrition, activity, and stress; intellectually through informal experiences and formal instruction; and socially through adult role models and peer relationships. With good environmental support, children thrive. Unfortunately, the conditions of nurture are not always nurturing. For example, children who grow up in an abusive family must look outside the family for stable, affectionate care.

Historically, many theorists saw nature and nurture as separate and rival factors. Some theorists believed that biological factors are ultimately responsible for growth. Other theorists assumed that children become whatever the environment shapes them to be. Increasingly, developmental theorists have come to realize that nature and nurture are both important and that they intermesh dynamically in the lives of children. Consider these principles of how nature and nurture exert separate and combined effects:

The relative effects of heredity and environment vary for different areas of development. Some abilities are strongly influenced by genetically controlled systems in the brain. For example, the ability to distinguish among speech sounds develops without training and under a wide range of environmental conditions (Flavell, 1994; Gallistel, Brown, Carey, Gelman, & Keil, 1991). In contrast, abilities in traditional school subject areas (e.g., reading, geography) and advanced artistic and physical skills (e.g., playing the piano, playing competitive soccer) rest heavily on instruction and practice (Gardner, Torff, & Hatch, 1996; Olson, 1994; R. Watson, 1996).

Inherited tendencies make children more or less responsive to particular environmental influences. Because of their genetic makeup, some children are easily affected by certain conditions in the environment, whereas others are less affected (Rutter, 1997). For example, children who are, by nature, inhibited may be quite shy around other people if they have few social contacts. If their parents and teachers encourage them to make friends, however, they may become more socially outgoing (Arcus, 1991; J. Kagan, 1998). In contrast, children who have more extroverted temperaments may be sociable regardless of the environment in which they grow up: They will persistently search for peers with whom they can talk, laugh, and spend time.

Environment may play a greater role in development when environmental conditions are extreme rather than moderate. When youngsters have experiences typical for their culture and age-group, heredity often plays a strong role in their individual characteristics. Thus, when children grow up with adequate nutrition, a warm and stable home environment, and appropriate educational experiences, heredity affects how quickly and thoroughly they acquire new skills. But when they have experiences that are quite unusual—for instance, when they experience extreme deprivation—the influence of environment outweighs that of heredity (D. C. Rowe,
Timing of environmental exposure matters. When children are changing rapidly in any area, they are especially prone to influence by the environment. For example, early in a mother's pregnancy, her use of certain drugs may damage the quickly growing organs and limbs of the developing fetus. Just prior to birth, exposure to the same drugs may adversely affect the baby's brain, which at that point is forming the connections that will permit survival and the ability to learn in the outside world.

In a few cases environmental stimulation must occur during a particular period for an emerging ability to become functional (Blakemore, 1976; Hubel & Wiesel, 1965). In such cases there is a critical period for stimulation. For example, at birth, certain areas of the brain are tentatively reserved for processing visual patterns—lines, shapes, contours, depth, and so forth. In virtually all cases, infants do encounter adequate stimulation to preserve these brain circuits. However, when cataracts are present at birth and not removed for a few years, a child's vision is obstructed, and areas of the brain that otherwise would be devoted to vision lose some of this capacity (Bruer, 1999).

In many and probably most other developmental areas, however, children may be most receptive to a certain type of stimulation at one point in their lives but be able to benefit from it to some degree later as well. Tonya, in the introductory case study, may have encountered only limited exposure to language as a result of her mother's weakened condition. Immersed later in a rich verbal environment, Tonya would have a second chance to expand her verbal talents. Thus educational experiences at a later time can often make up for experiences missed at an earlier period (Bruer, 1999). Many theorists use the term sensitive period (rather than critical period) when referring to such a long time frame of heightened sensitivity to particular environmental experiences.

Children's natural tendencies affect their environment. In addition to being affected by nature and nurture, children's own behaviors influence their growth. Youngsters make many choices, seek out information, and, over time, refine their ideas (Flavell, 1994; Piaget, 1985). For example, children often request information ("What cooperate mean, Mommy?") and experiences ("Uncle Kevin, can I play on your computer?"). Children even help create environments that exacerbate their genetic tendencies. For example, children with irritable dispositions might pick fights and provoke others to lash back at them, creating a more aggressive climate in which to grow. As children get older, they become increasingly able to seek stimulation that suits their tendencies. For example, imagine that Marissa has an inherited talent for verbal skills—learning vocabulary, comprehending stories, and so on. As a baby, she relies on her parents to talk to her. As a toddler, she asks her parents for particular kinds of stimulation ("Read book, Daddy!"). In elementary school she reads to herself from books supplied by her teachers. As a teenager, she takes the bus to the library and selects her own books. Marissa's experience would suggest that genetic tendencies become more powerful as children grow older—an expectation that is in fact consistent with genetic research (Scarr & McCartney, 1983).