urge to stand and walk upright is very strong, however, and babies work hard to accomplish this task. By seven to eight months, infants can usually stand holding on to a playpen or other object; at 10 or 11 months they can walk with assistance, and by 13 months they can usually take a few steps unaided.

As infants are developing physically, they are also developing cognitively in their ability to perform such mental processes as thinking, knowing, and remembering. The theory of childhood cognitive development developed by the Swiss psychologist Jean Piaget describes four stages of increasingly complex and abstract thought that occur between birth and adolescence, each qualitatively different from but dependent upon the stages before it. The first, or sensorimotor, stage, (birth to approximately two years), is a time of nonverbal, experimental basic learning when infants gradually gain mastery of their own bodies and external objects. By sucking, shaking, banging, hitting, and other physical acts, children at this age learn about the properties of objects and how to manipulate them. The main goal at this stage is to achieve what Piaget termed “object constancy,” or permanence: the sense that objects exist even when they are not visible and that they are independent of the infant’s own actions. This sense forms the basis for the perception of a stable universe. The sensorimotor stage is followed by the preoperational stage (ages two to six), which involves the association of objects with words.

Infants are born with different temperaments. There are “easy babies,” who are cheerful and seldom fuss; difficult babies, who are often irritable; and timid babies, who are wary when approaching new situations. Most people believe that temperament is inborn, although there is little hard evidence to prove it. Temperament’s interaction with a variety of environmental factors, including parental expectations, determines the course of an individual’s development. The most important aspect of an infant’s socialization is forming secure attachments, primarily to parents or other principal caregivers. Attachment problems may have a negative effect on a child’s normal development. Initially, infants will respond positively to all contact with adults, even though they recognize familiar faces and prefer their mother or other primary caregiver. By the age of three months, babies will begin to smile in response to outside stimuli, maintain eye contact, and vocalize, as distinguished from crying. Eventually, they will advance to what Piaget called the “secondary level” of concentration, at which they are aware of social changes in addition to objects and events. During this period, infants enjoy social contact and will fuss when left alone. They are able to distinguish their parents from other people, will smile and vocalize at familiar people, and will cry when those individuals are absent. At the age of six or seven months, when infants develop a conception of object permanence, an especially strong bond begins to form with the primary caregiver, usually the mother. This is accompanied by separation anxiety (distress at being separated from the primary caregiver) and stranger anxiety (shyness or fear in the presence of strangers). Such behaviors are an integral part of normal cognitive development and displays a healthy attachment to the primary caregiver.

During the second year of life, the infant’s focus of socialization extends beyond the primary caregiver to the family unit as a whole and includes gaining some control over emotions and accepting discipline. In Erik Erikson’s eight-stage theory of personality, the most important task in the first 18 months of an infant’s life is establishing a basic sense of trust in the world, accomplished initially by the attachment formed with the primary caregivers. Sometime after his or her first birthday, an infant begins developing a tremendous need for autonomy, inevitably accompanied by a sense of doubt and shame brought on by learning to follow rules and social demands for self-control, including physical control (such as toilet training). The conflict between autonomy and doubt occupies much of a child’s second year and continues into the third. Successfully negotiated, this stage leads to the emergence of independence and will power, and a sense of self-awareness—which appears to depend upon a combination of cognitive development, socialization, and linguistic skills—slowly develops during the second year of life.

Further Reading

### Inferiority complex
A psychological condition that exists when a person’s feelings of inadequacy are so intense that daily living is impaired.

The term “inferiority complex” was coined in the 1920s by French psychologist Alfred Adler, a one-time follower of Sigmund Freud who became disenchanted with Freud’s emphasis on the influence of unconscious factors as motivators in human behavior. While Adler subscribed to the notion that underlying motivations play a part in directing personality, he introduced the notion of “ego psychology” in an effort to give equal impor-
tance to the role of conscious factors in determining behavior. According to Adler, all humans experience feelings of inferiority as children and spend the rest of their lives trying to compensate for those feelings. As people replace the dependence of childhood with the independence of adulthood, the feelings of inferiority persist in varying intensity in different people. For some people, the sense of inferiority serves as a positive motivating factor, as they strive to improve themselves in an effort to neutralize the negative feelings of inferiority. Some, however, become dominated—and, as a result, crippled—by an overwhelming sense of inadequacy. These people, whose thoughts are so overtaken by these feelings that they cannot function normally, are said to have an inferiority complex. The opposite of inferiority complex, a superiority complex, can also result from the inevitable early feelings of inferiority, Adler believed. This results when a person overcompensates and places too much emphasis on striving for perfection.

Further Reading

Information-processing theory
A leading orientation in experimental psychology that focuses on how people select, process, and internalize information and how they use it to make decisions and guide their behavior.

The information-processing theory is associated with the development of high-speed computers in the 1950s. Researchers—most notably Herbert Simon and his colleagues—demonstrated that computers could be used to simulate human intelligence. This development led to the realization that computer-oriented information-processing models could provide new insight into how the human mind receives, stores, retrieves, and uses information. The information-processing theory was one of several developments that ended the decades-long dominance of behaviorism in American psychology. It focused on innate mental capacities, rather than on conditioned, externally observable behavior. By enabling experimental psychologists to test theories about complex mental processes through computer simulation, information-processing models helped reestablish internal thought processes as a legitimate area of scientific inquiry.

The information-processing theory of human cognition encompasses several basic stages. Information received from external or internal stimuli is inputted through the senses and transformed by a variety of mental operations (including representation by symbols). It receives attention through the perceptual processes and is stored in either short-term or long-term memory, where it interacts with previously stored information to generate a response, or output. These stages may take place in a number of different arrangements. The simplest is the serial model, in which the stages occur in succession like a chain reaction, with the output of each stage becoming the input of the succeeding one. However, stages can also occur simultaneously, a phenomenon known as parallel processing. Serial and parallel processing can also be combined in what are known as hybrid models. Another important characteristic of information-processing models is resource allocation—the way in which energy is distributed in the system. This refers to the fact that the efficiency of each stage in the process may depend on whether certain other stages are operating at the same time.

One of the many areas investigated through the use of information-processing models is human error. Errors that occur during the early stages of processing, such as misunderstandings, are called mistakes, as distinguished from slips, which occur during the selection or execution of responses. The increased understanding of error provided by information-processing models has been useful in eliminating a variety of technical and industrial problems by isolating and addressing their causes. Those problems classified as mistakes often involve the size of an information load and the way it is handled, while slips are commonly remedied by redesigning instruments and equipment so they can be used more efficiently.

Another area that has been investigated using information-processing theory is reaction time—the amount of time needed to respond to a stimulus in a particular situation. Reaction time is an important feature in the design of automobiles and many other products. Factors influencing reaction time include complexity of the decision required before action can be taken; stimulus-response compatibility (the physical convenience of the reaction); expectancy (it takes longer to respond to an unexpected stimulus); and the relative importance of speed and accuracy in the required response.

Further Reading