4. Development of Human Behavior

Growth and development; Principles of development, Role of genetic and environmental factors in determining human behavior; Influence of cultural factors in socialization; Life span development - Characteristics, development tasks, promoting psychological well-being across major stages of the life span.
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Developmental psychology: Overview

Developmental psychology, also known as human development, is the scientific study of systematic psychological changes, emotional changes, and perception changes that occur in human beings over the course of their life span. Originally concerned with infants and children, the field has expanded to include adolescence, adult development, aging, and the entire life span. This field examines change across a broad range of topics including motor skills and other psycho-physiological processes; cognitive development involving areas such as problem solving, moral understanding, and conceptual understanding; language acquisition; social, personality, and emotional development; and self-concept and identity formation.

Developmental psychology includes issues such as the extent to which development occurs through the gradual accumulation of knowledge versus stage-like development, or the extent to which children are born with innate mental structures versus learning through experience. Many researchers are interested in the interaction between personal characteristics, the individual’s behavior, and environmental factors including social context, and their impact on development; others take a more narrowly-focused approach.

Developmental psychology informs several applied fields, including: educational psychology, child psychopathology, and forensic developmental psychology. Developmental psychology complements several other basic research fields in psychology including social psychology, cognitive psychology, ecological psychology, and comparative psychology.

Approaches

Many theoretical perspectives attempt to explain development; among the most prominent are: Jean Piaget’s Stage Theory, Lev Vygotsky’s Social constructivism (and its heirs, the Cultural Theory of Development of Michael Cole, and the Ecological Systems Theory of Urie Bronfenbrenner), Albert Bandura’s Social learning theory, and the information processing framework employed by cognitive psychology.

To a lesser extent, historical theories continue to provide a basis for additional research. Among them are Erik Erikson’s eight stages of psychosocial development and John B. Watson’s and B.F. Skinner’s behaviorism (for more on behaviorism’s role see Behavior analysis of child development).

Many other theories are prominent for their contributions to particular aspects of development. For example, attachment theory describes kinds of interpersonal relationships and Lawrence Kohlberg describes stages in moral reasoning.

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Theorists and theories

- John Bowlby, Harry Harlow, Mary Ainsworth: Attachment theory
- Urie Bronfenbrenner: The social ecology of human development
- Jerome Bruner: Cognitive (constructivist); learning theory / narrative construction of reality
- Erik Erikson: Erikson’s stages of psychosocial development
- Sigmund Freud: Psychosexual development
- Jerome Kagan: A pioneer of developmental psychology
- Jean Matter Mandler: Early development – theory of early conceptual thinking
- Lawrence Kohlberg: Kohlberg’s stages of moral development
- Jean Piaget: Theory of cognitive development, genetic epistemology
- Lev Vygotsky: Social constructivism, zone of proximal development
- Reuven Feuerstein: Structural Cognitive Modifiability
- Judith Rich Harris: Modular theory of social development
- Eleanor Gibson: Ecological psychology
- Robert Kegan: Adult development

Piagetian stages of cognitive development

Piaget was a French speaking Swiss theorist who posited that children learn by actively constructing knowledge through hands-on experience. He suggested that the adult’s role in helping the child learn was to provide appropriate materials for the child to interact and construct. He would use Socratic questioning to get the children to reflect on what they were doing. He would try to get them to see contradictions in their explanations. He also developed stages of development. His approach can be seen in how the curriculum is sequenced in schools, and in the pedagogy of preschool centers across the United States.

Vygotsky’s cultural–historical theory

Vygotsky was a theorist from the Soviet era, who posited that children learn through hands-on experience, as Piaget suggested. However, unlike Piaget, he claimed that timely and sensitive intervention by adults when a child is on the edge of learning a new task (called the “zone of proximal development”) could help children learn new tasks. Martin Hill stated that "The world of reality does not apply to the mind of a child." This technique is called "scaffolding,” because it builds upon knowledge children already have with new knowledge that adults can help the child learn. Vygotsky was strongly focused on the role of culture in determining the child’s pattern of development, arguing that development moves from the social level to the individual level.
Ecological Systems Theory

Also called "Development in Context" or "Human Ecology" theory, Ecological Systems Theory, originally formulated by Urie Bronfenbrenner specifies four types of nested environmental systems, with bi-directional influences within and between the systems. The four systems are microsystem, mesosystem, exosystem, and macrosystem. Each system contains roles, norms and rules that can powerfully shape development. Since its publication in 1979, Bronfenbrenner's major statement of this theory, The Ecology of Human Development has had widespread influence on the way psychologists and others approach the study of human beings and their environments. As a result of this conceptualization of development, these environments—from the family to economic and political structures—have come to be viewed as part of the life course from childhood through adulthood.

Attachment theory

Attachment theory, originally developed by John Bowlby, focuses on open, intimate, emotionally meaningful relationships. Attachment is described as a biological system or powerful survival impulse that evolved to ensure the survival of the infant. A child who is threatened or stressed will move toward caregivers who create a sense of physical, emotional and psychological safety for the individual. Attachment feeds on body contact and familiarity. Later Mary Ainsworth developed the Strange Situation Protocol and the concept of the secure base. See also the critique by developmental psychology pioneer Jerome Kagan.

Unfortunately, there are situations that inhibit a child from forming attachments. Some babies are raised without the stimulation and attention of a regular caregiver, or locked away under conditions of abuse or extreme neglect. The possible short-term effects of this deprivation are anger, despair, detachment, and temporary delay in intellectual development. Long-term effects include increased aggression, clinging behavior, detachment, psychosomatic disorders, and an increased risk of depression as an adult.

Nature/nurture

A significant issue in developmental psychology is the relationship between innateness and environmental influence in regard to any particular aspect of development. This is often referred to as "nature versus nurture" or nativism versus empiricism. A nativist account of development would argue that the processes in question are innate, that is, they are specified by the organism's genes. An empiricist perspective would argue that those processes are acquired in interaction with the environment. Today developmental psychologists rarely take such extreme positions with regard to most aspects of development; rather they investigate, among many other things, the relationship between innate and environmental
influences. One of the ways in which this relationship has been explored in recent years is through the emerging field of evolutionary developmental psychology.

One area where this innateness debate has been prominently portrayed is in research on language acquisition. A major question in this area is whether or not certain properties of human language are specified genetically or can be acquired through learning. The empiricist position on the issue of language acquisition suggests that the language input provides the necessary information required for learning the structure of language and that infants acquire language through a process of statistical learning. From this perspective, language can be acquired via general learning methods that also apply to other aspects of development, such as perceptual learning. The nativist position argues that the input from language is too impoverished for infants and children to acquire the structure of language. Linguist Noam Chomsky asserts that, evidenced by the lack of sufficient information in the language input, there is a universal grammar that applies to all human languages and is pre-specified. This has led to the idea that there is a special cognitive module suited for learning language, often called the language acquisition device. Chomsky's critique of the behaviorist model of language acquisition is regarded by many as a key turning point in the decline in the prominence of the theory of behaviorism generally. But Skinner's conception of "Verbal Behavior" has not died, perhaps in part because it has generated successful practical applications.

Mechanisms of development

Developmental psychology is concerned not only with describing the characteristics of psychological change over time, but also seeks to explain the principles and internal workings underlying these changes. Psychologists have attempted to better understand these factors by using models. Developmental models are sometimes computational, but they do not need to be. A model must simply account for the means by which a process takes place. This is sometimes done in reference to changes in the brain that may correspond to changes in behavior over the course of the development. Computational accounts of development often use either symbolic, connectionist (neural network), or dynamical systems models to explain the mechanisms of development.

Research areas

Cognitive development

Cognitive development is primarily concerned with the ways in which infants and children acquire, develop, and use internal mental capabilities such as problem solving, memory, and language. Major topics in cognitive development are the study of language acquisition and the development of perceptual and motor skills. Piaget was one of the influential early psychologists to study the development of cognitive

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abilities. His theory suggests that development proceeds through a set of stages from infancy to adulthood and that there is an end point or goal. Other accounts, such as that of Lev Vygotsky, have suggested that development does not progress through stages, but rather that the developmental process that begins at birth and continues until death is too complex for such structure and finality. Rather, from this viewpoint, developmental processes proceed more continuously, thus development should be analyzed, instead of treated as a product to be obtained.

Modern cognitive development has integrated the considerations of cognitive psychology and the psychology of individual differences into the interpretation and modeling of development. Specifically, the neo-Piagetian theories of cognitive development showed that the successive levels or stages of cognitive development are associated with increasing processing efficiency and working memory capacity. These increases explain progression to higher stages, and individual differences in such increases by same-age persons explain differences in cognitive performance. Other theories have moved away from Piagetian stage theories, and are influenced by accounts of domain-specific information processing, which posit that development is guided by innate evolutionarily-specified and content-specific information processing mechanisms.

**Social and emotional development**

Developmental psychologists who are interested in social development examine how individuals develop social and emotional competencies. For example, they study how children form friendships, how they understand and deal with emotions, and how identity develops. Research in this area may involve study of the relationship between cognition or cognitive development and social behavior.

**Research methods**

Developmental psychology employs many of the research methods used in other areas of psychology. However, infants and children cannot always be tested in the same ways as adults, so different methods are often used to study their development.

**Methods and techniques**

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**Research design**

Developmental psychologists have a number of methods to study changes in individuals over time.

In a longitudinal study, a researcher observes many individuals born at or around the same time (a cohort) and carries out new observations as members of the cohort age. This method can be used to draw conclusions about which types of development are universal (or normative) and occur in most members of a cohort. As an example a longitudinal study of early literacy development examined in detail the early literacy experiences of one child in each of 30 families. Researchers may also observe ways in which development varies between individuals and hypothesize about the causes of variation observed in their data. Longitudinal studies often require large amounts of time and funding, making them unfeasible in some situations. Also, because members of a cohort all experience historical events unique to their generation, apparently normative developmental trends may in fact be universal only to their cohort.

In a cross-sectional study, a researcher observes differences between individuals of different ages at the same time. This generally requires less resources than the longitudinal method, and because the individuals come from different cohorts, shared historical events are not so much of a confounding factor. By the same token, however, cross-sectional research may not be the most effective way to study differences between participants, as these differences may result not from their different ages but from their exposure to different historical events.

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A third study design, the cohort study, combines both methodologies. Here, a researcher observes members of different birth cohorts at the same time, and then tracks all participants over time, charting changes in the groups. While much more resource-intensive, the format aids in a clearer distinction between what changes can be attributed to individual or historical environment from those which are truly universal.

Notably, these are all correlational, not experimental, designs, and so one cannot readily infer causation from the data they yield. Nonetheless, correlational research methods are common in the study of development, in part due to ethical concerns. In a study of the effects of poverty on development, for instance, one cannot easily randomly assign certain families to a poverty condition and others to an affluent one, and so observation alone has to suffice.

**Stages of development**

**Pre-natal development**

Pre-natal development is of interest to psychologists investigating the context of early psychological development. For example, some primitive reflexes arise before birth and are still present in newborns. One hypothesis is that these reflexes are vestigial and have limited use in early human life. Piaget’s theory of cognitive development suggested that some early reflexes are building blocks for infant sensorimotor development. For example the tonic neck reflex may help development by bringing objects into the infant’s field of view. Other reflexes, such as the walking reflex appear to be replaced by more sophisticated voluntary control later in infancy. This may be because the infant gains too much weight after birth to be strong enough to use the reflex, or because the reflex and subsequent development are functionally different. It has also been suggested that some reflexes (for example the moro and walking reflexes) are predominantly adaptations to life in the womb with little connection to early infant development. Primitive reflexes reappear in adults under certain conditions, such as neurological conditions like dementia or traumatic lesions.

Ultrasound has shown that infants are capable of a range of movements in the womb, many of which appear to be more than simple reflexes. By the time they are born, infants can recognize and have a preference for their mother’s voice suggesting some pre-natal development of auditory perception. Pre-natal development and birth complications may also be connected to neurodevelopmental disorders, for example in schizophrenia. With the advent of cognitive neuroscience, embryology and the neuroscience of pre-natal development is of increasing interest to developmental psychology research.

**Infancy**
From birth until the onset of speech, the child is referred to as an infant. Developmental psychologists vary widely in their assessment of infant psychology, and the influence the outside world has upon it, but certain aspects are relatively clear.

The majority of a newborn infant’s time is spent in sleep. At first this sleep is evenly spread throughout the day and night, but after a couple of months, infants generally become diurnal.

**Infants can be seen to have six states, grouped into pairs:**

- quiet sleep and active sleep (dreaming, when REM sleep occurs)
- quiet waking, and active waking
- fussing and crying

**Infants respond to stimuli differently in these different states.**

Habituation (see above) has been used to discover the resolution of perceptual systems, suggesting that infants' basic perceptual abilities develop before acquisition of object permanence.

**Vision** is significantly worse in infants than in older children. Infant sight, blurry in early stages, improves over time. Color perception similar to that seen in adults has been demonstrated in infants as young as four months, using habituation methods.

**Hearing** is well-developed prior to birth, however, and a preference for the mother's heartbeat is well-established. Infants are fairly good at detecting the direction from which a sound comes, and by 18 months their hearing ability is approximately equal to that of adults.

**Smell and taste** are present, with infants showing different expressions of disgust or pleasure when presented with pleasant odors (honey, milk, etc.) or unpleasant odors (rotten egg) and tastes (e.g. sour taste). There is good evidence for infants preferring the smell of their mother to that of others.

**Language:** infants of around six months can differentiate between phonemes in their own language, but not between similar phonemes in another language. At this stage infants also start to babble, producing phonemes.

**Touch** is one of the better-developed senses at birth, being one of the first to develop inside the womb. This is evidenced by the primitive reflexes described above, and the relatively advanced development of the somatosensory cortex.
Pain: Infants feel pain similarly, if not more strongly than older children but pain-relief in infants has not received so much attention as an area of research.

An early theory of infant development was the Sensorimotor stage of Piaget's Theory of cognitive development. Piaget suggested that an infant's perception and understanding of the world depended on their motor development, which was required for the infant to link visual, tactile and motor representations of objects. According to this view, it is through touching and handling objects that infants develop object permanence, the understanding that objects are solid, permanent, and continue to exist when out of sight.

Special methods are used to study infant behavior.

Piaget's Sensorimotor Stage comprised six sub-stages (see sensorimotor stages for more detail). In the early stages, development arises out of movements caused by primitive reflexes. Discovery of new behaviors results from classical and operant conditioning, and the formation of habits. From eight months the infant is able to uncover a hidden object but will persevere when the object is moved. Piaget's evidence for an incomplete understanding of object permanence before 18 months was the infant's failure to look for an object where it was last seen. Instead infants continue to look for an object where it was first seen, committing the "A-not-B error."

Later researchers have developed a number of other tests which suggest that younger infants understand more about objects than first thought. These experiments usually involve a toy, and a crude barrier which is placed in front of the toy, and then removed, repeatedly. Before the age of eight to nine months, infants' inability to understand object permanence extends to people, which explains why infants at this age do not cry when their mothers are gone ("Out of sight, out of mind").

There are critical periods in infancy and childhood during which development of certain perceptual, sensorimotor, social and language systems depends crucially on environmental stimulation. Feral children such as Genie, deprived of adequate stimulation, fail to acquire important skills which they are then unable to learn in later childhood. The concept of critical periods is also well-established in neurophysiology, from the work of Hubel and Wiesel among others. Some feel that classical music, particularly Mozart is good for an infant's mind. While some tentative research has shown it to be helpful to older children, no conclusive evidence is available involving infants.

Babyhood

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Intelligence is demonstrated through the use of symbols, language use matures, and memory and imagination are developed. Thinking is done in a non-logical, nonreversible manner. Egocentric thinking predominates.

Socially, toddlers are little people attempting to become independent at this stage, which they are commonly called the "terrible twos." They walk, talk, use the toilet, and get food for themselves. Self-control begins to develop. If taking the initiative to explore, experiment, risk mistakes in trying new things, and test their limits is encouraged by the caretaker(s) the child will become autonomous, self-reliant, and confident. If the caretaker is overprotective or disapproving of independent actions, the toddler may begin to doubt their abilities and feel ashamed for the desire for independence. The child's autonomic development will be inhibited, and be less prepared to successfully deal with the world in the future.

**Early childhood**

Also called "pre-school age," "exploratory age" and "toy age."

When children attend preschool, they broaden their social horizons and become more engaged with those around them. Impulses are channeled into fantasies, which leaves the task of the caretaker to balance eagerness for pursuing adventure, creativity and self expression with the development of responsibility. If caretakers are properly encouraging and consistently disciplinary, children are more likely to develop positive self-esteem while becoming more responsible, and will follow through on assigned activities. If not allowed to decide which activities to perform, children may begin to feel guilt upon contemplating taking initiative. This negative association with independence will lead them to let others make decisions in place of them.

**Late childhood**

In middle childhood, intelligence is demonstrated through logical and systematic manipulation of symbols related to concrete objects. Operational thinking develops, which means actions are reversible, and egocentric thought diminishes.

Children go through the transition from the world at home to that of school and peers. Children learn to make things, use tools, and acquire the skills to be a worker and a potential provider. Children can now receive feedback from outsiders about their accomplishments. If children can discover pleasure in intellectual stimulation, being productive, seeking success, they will develop a sense of competence. If they are not successful or cannot discover pleasure in the process, they may develop a sense of inferiority and feelings of inadequacy that may haunt them throughout life. This is when children think of themselves as industrious or as inferior.
Adolescence

Adolescence is the period of life between the onset of puberty and the full commitment to an adult social role, such as worker, parent, and/or citizen. It is the period known for the formation of personal and social identity (see Erik Erikson) and the discovery of moral purpose (see William Damon). Intelligence is demonstrated through the logical use of symbols related to abstract concepts and formal reasoning. A return to egocentric thought often occurs early in the period. Only 35% develop the capacity to reason formally during adolescence or adulthood. (Huit, W. and Hummel, J. January 1998)

It is divided into two parts namely:

Early Adolescence: 13 to 16 years and
Late Adolescence: 16 to 19 years

The adolescent unconsciously explores questions such as "Who am I? Who do I want to be?" Like toddlers, adolescents must explore, test limits, become autonomous, and commit to an identity, or sense of self. Different roles, behaviors and ideologies must be tried out to select an identity. Role confusion and inability to choose vocation can result from a failure to achieve a sense of identity through, for example, friends.

Early adulthood

The person must learn how to form intimate relationships, both in friendship and love. The development of this skill relies on the resolution of other stages. It may be hard to establish intimacy if one has not developed trust or a sense of identity. If this skill is not learned the alternative is alienation, isolation, a fear of commitment, and the inability to depend on others.

A related framework for studying this part of the life span is that of emerging adulthood, introduced in 2000 by Jeffrey Arnett. Scholars of emerging adulthood are interested not only in relationship development (focusing on the role of dating in helping individuals settle on a long-term spouse/partner), but also the development of sociopolitical views and occupational choice.

Middle age

Middle adulthood generally refers to the period between ages 40 to 60. During this period, the middle-aged experience a conflict between generativity and stagnation. They may either feel a sense of contributing to the next generation and their community or a sense of purposelessness.
Physically, the middle-aged experience a decline in muscular strength, reaction time, sensory keenness, and cardiac output. Also, women experience menopause and a sharp drop in the hormone estrogen. Men do have an equivalent to menopause, it is called andropause which is a hormone fluctuation with physical and psychological effects similar to menopause. Lowered testosterone levels result in mood swings and a decline in sperm count and speed of ejaculation and erection. Most men and women remain capable of sexual satisfaction after middle age. Compare Erikson’s stages of psychosocial development.

**Old age**

This stage generally refers to those over 60–80 years. During old age, people experience a conflict between integrity vs. despair. When reflecting on their life, they either feel a sense of accomplishment or failure.

Physically, older people experience a decline in muscular strength, reaction time, stamina, hearing, distance perception, and the sense of smell. They also are more susceptible to severe diseases such as cancer and pneumonia due to a weakened immune system. Mental disintegration may also occur, leading to dementia or Alzheimer’s disease. However, partially due to a lifetime’s accumulation of antibodies, the elderly are less likely to suffer from common diseases such as the cold.

Whether or not intellectual powers increase or decrease with age remains controversial. Longitudinal studies have suggested that intellect declines, while cross-sectional studies suggest that intellect is stable. It is generally believed that crystallized intelligence increases up to old age, while fluid intelligence decreases with age.

**Other findings**

**Parenting**

In Western developed societies, mothers (and women generally) were emphasized to the exclusion of other caregivers, particularly as the traditional role of the father was more the breadwinner, and less the direct caregiver of an infant, he has been traditionally viewed as impacting an infant indirectly through interactions with the mother of the child.

The emphasis of study has shifted to the primary caregiver (regardless of gender or biological relation), as well as all persons directly or indirectly influencing the child (the family system). The roles of the mother and father are more significant than first thought as we moved into the concept of primary caregiver.

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Affirming a role for fathers, studies have shown that children as young as 15 months benefit significantly from substantial engagement with their father. In particular, a study in the U.S. and New Zealand found the presence of the natural father was the most significant factor in reducing rates of early sexual activity and rates of teenage pregnancy in girls. Covariate factors used included early conduct problems, maternal age at first childbirth, race, maternal education, father's occupational status, family living standards, family life stress, early mother–child interaction, measures of psychosocial adjustment and educational achievement, school qualifications, mood disorder, anxiety disorder, suicide attempts, violent offending, and conduct disorder. Further research has found fathers have an impact on child academic performance, including involved nonresident fathers. However, father absence is associated with a range of negative outcomes for children, including child and later criminal behavior.

**Historical antecedents**

The modern form of developmental psychology has its roots in the rich psychological tradition represented by Aristotle, Tabari, Rhazes and Descartes. William Shakespeare had his melancholy character Jacques (in As You Like It) articulate the seven ages of man: these included three stages of childhood and four of adulthood. In the mid-18th century Jean Jacques Rousseau described three stages of childhood: infants (infancy), puer (childhood) and adolescence in Emile: Or, On Education. Rousseau's ideas were taken up strongly by educators at the time.

In the late 19th century, psychologists familiar with the evolutionary theory of Darwin began seeking an evolutionary description of psychological development; prominent here was G. Stanley Hall, who attempted to correlate ages of childhood with previous ages of mankind.

A more scientific approach was initiated by James Mark Baldwin, who wrote essays on topics that included Imitation: A Chapter in the Natural History of Consciousness and Mental Development in the Child and the Race: Methods and Processes. In 1905, Sigmund Freud articulated five psychosexual stages. Later, Rudolf Steiner articulated stages of psychological development throughout human life. By the early to mid-20th century, the work of Vygotsky and Piaget, mentioned above, had established a strong empirical tradition in the field.

**Nature vs. Nurture in Infant Development**

Nature vs. Nurture is an issue that has been around for ages and will continue to do so. With numerous articles being published about both Nature and Nurture there has not been any proof of one having a larger affect on a person than the other. Nature is heredity and nurture is more of dealing with the environment. The issues of dealing with whether nature or nurture has a larger effect on humans are still

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being debated to this day. The fact that both sides present strong arguments defending their own importance – it is one of the major reasons why it is such a enormous debate that is still taking place. Nature is allegedly what determines a person’s personality, physical appearance, and other factors that are genetically passed down. Anything that deals with traits and characteristics is believed to be caused by inborn biology. Therefore, many American parents believe that when their child misbehaves or displays bad traits – some people believe it is due to bad parenting, and some believe that it is due to biology. Many believe that bad traits run through the family. Nurture is the other side of the argument debates that the reason to a persons behavior and characters are through a persons surroundings and environment. It is believed that the environment of a person has the power to change what we are. Nurture researchers also believed that a child can be brought up to what you want it to turn out. It has proven that a child’s intelligence are shaped with challenges, experiences, people, objects and events they face almost every day in their lives. Some believe that parents are the key ingredients to an intellectual developed infant. For example: If a parent were to not send a child to school; the differences between a child with a state education and a child with no education is large. The child with state education will be more educated and ready for the real world compared to a child with no education. And a child’s education is dependent on the infant's parents/guardian. It has shown that infant's intelligence is shaped and influenced by its experiences and influences over time. In an article written by Jennifer Viegas in 2000 called, “Study Says Environment, Not Genetics, Defines Sense of Humor” talked about how the sense of humor in adults are not from genetics, but are from the surroundings of the human. Recent study has found that the sense of humor in a person is a learned trait and that family and cultural environments influence it. It has been seen that the battle between both Nature and Nurture will continue forever. The reason for this because both sides can easily be backed up with facts and supporting information. Therefore, when things are argued – it is always fought back with new information. However, the fact that both ideas of nature and nurture contains a lot of disagreement. Their disagreements benefit them in ways that the debate will never end. Their flaws are what keeps each others to continue research and discover new things.

“I could take a child at random and, by controlling the environment, I could condition the child to grow up to be a doctor, artist, or thief...”

-John Broadus Watson

“.…. But the genetic influence on traits and behaviors is only partial: Genetics account, on average, for half of the variance of most traits. That means the environment accounts for the rest.”

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- Robert Plomin, Psychologist

can be translated into...

"We receive genes from our family, but our environment and nurturing can alter that if strong enough, as an influence. Whether we notice it or not, nature and nurture are mixed in with each other, influencing traits of everyone."

- Shady Guirguis, April 26, 2004, NE 24

**Child development stages**

Child development stages describe theoretical milestones of child development. Many stage models of development have been proposed, used as working concepts and in some cases asserted as nativist theories.

This article puts forward a general model based on the most widely accepted developmental stages. However, it is important to understand that there is wide variation in terms of what is considered "normal," driven by a wide variety of genetic, cognitive, physical, family, cultural, nutritional, educational, and environmental factors. Many children will reach some or most of these milestones at different times from the norm.

**Specifications sorted by reached age**

**1–4 months**

**Physical**

- Head and chest circumference are nearly equal to the part of the abdomen.
- Head circumference increases approximately 2 cm per month until two months, then increases 1.5 cm per month until four months.
- Increases are an important indication of continued brain growth.
- Continues to breathe using abdominal muscles.
- Posterior fontanelle.
- Anterior fontanelle.
- Skin remains sensitive and easily irritated.
- Legs.
- Cries with tears.
- Gums are red.
- Eyes begin moving together in unison (binocular vision).
Motor development

- Rooting and sucking reflexes are well developed.
- Swallowing reflex and tongue movements are immature; inability to move food to the back of the mouth.
- Grasp reflex.
- Landau reflex appears near the middle of this period; when baby is held in a prone (face down) position, the head is held upright and legs are fully extended.
- Grasps with entire hand; strength insufficient to hold items. Holds hands in an open or semi-open position.
- Movements are large and jerky.
- Raises head and upper body on arms when in a prone position.
- Turns head side to side when in a supine (face up) position; can not hold head up and line with the body.
- Upper body parts are more active: clasps hands above face, waves arms about, reaches for objects.

4–8 months

Physical

- Head and chest circumferences are basically equal.
- Head circumference increases approximately 1 cm per month until six to seven months, then 0.5 cm per month; head circumference should continue to increase steadily, indicating healthy, ongoing brain growth.
- Posterior fontanelle closing or fully closed.
- Anterior fontanelle.
- Breathing is abdominal; respiration rate depending on activity; rate and patterns vary from infant to infant.
- Teeth may begin to appear, with upper and lower incisors coming in first. Gums may become red and swollen, accompanied by increased drooling, chewing, biting, and mouthing of objects.
- Legs may appear bowed; bowing gradually disappears as infant grows older.
- Fat rolls ("Baby Fat") appear on thighs, upper arms and neck.
- True eye color is established.

Motor development

- Reflexive behaviors are changing:
- Blinking reflex is well established
- Sucking reflex becomes voluntary
- Moro reflex disappears
When lowered suddenly, infant throws out arms as a protective measure.
Swallowing reflex appears and allows infant to move solid foods from front of mouth to the back for swallowing.
Picks up objects using finger and thumb (pincer grip).
Reaches for objects with both arms simultaneously; later reaches with one hand or the other.
Transfers objects from one hand to the other; grasps object using entire hand (palmar grasp).
Handles, shakes, and pounds objects; puts everything in mouth.
Able to hold bottle.
Sits alone without support, holding head erect, back straightened, and arms propped forward for support.
Pulls self into a crawling position by raising up on arms and drawing knees up beneath the body; rocks back and forth, but generally does not move forward.
Lifts head when placed on back.
Can roll over from back or stomach position.
May accidentally begin scooting backwards when placed on stomach; soon will begin to crawl forward.
Looks for fallen objects by 7 months
Plays ‘peek-a-boo’ games
Cannot understand “no” or “danger”

8–12 Months

Physical

- Respiration rates vary with activity
- Environmental conditions, weather, activity, and clothing still affect variations in body temperature.
- Head and chest circumference remain equal.
- Anterior fontanelle begins to close.
- Continues to use abdominal muscles for breathing.
- More teeth appear, often in the order of two lower incisors then two upper incisors followed by four more incisors and two lower molars but some babies may still be waiting for their first.
- Arm and hands are more developed than feet and legs (cephalocaudal development); hands appear large in proportion to other body parts.
- Legs may continue to appear bowed.
- "Baby Fat" continues to appear on thighs, upper arms and neck.
- Feet appear flat as arch has not yet fully developed.
- Both eyes work in unison (true binocular coordination).
- Can see distant objects (4 to 6 m or 13 to 20 ft away) and points at them.

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Motor development

- Reaches with one hand leading to grasp an offered object or toy.
- Manipulates objects, transferring them from one hand to the other.
- Explores new objects by poking with one finger.
- Uses deliberate pincer grasp to pick up small objects, toys, and finger foods.
- Stacks objects; also places objects inside one another.
- Releases objects or toys by dropping or throwing; cannot intentionally put an object down.
- Beginning to pull self to a standing position.
- Beginning to stand alone, leaning on furniture for support; moves around obstacles by side-stepping.
- Has good balance when sitting; can shift positions without falling.
- Creeps on hands and knees; crawls up and down stairs.
- Walks with adult support, holding onto adult's hand; may begin to walk alone.
- Watches people, objects, and activities in the immediate environment.
- Shows awareness of distant objects (4 to 6 m or 13 to 20 ft away) by pointing at them.
- Responds to hearing tests (voice localization); however, loses interest quickly and, therefore, may be difficult to test formally.
- Follows simple instructions.
- Reaches for toys that are out of reach but visible.
- Recognizes objects in reverse.
- Drops thing intentionally and repeats and watches object.
- Imitates activities like playing drum.

Toddler's (12–24 months)

Physical

- Weight is now approximately 3 times the child’s birth weight.
- Respiration rate varies with emotional state and activity.
- Rate of growth slows.
- Head size increases slowly; grows approximately 1.3 cm every six months; anterior fontanelle is nearly closed at eighteen months as bones of the skull thicken.
- Anterior fontanelle closing or fully closed, usually at the middle of this year.
- Chest circumference is larger than head circumference.
- Legs may still appear bowed.
- Toddler will begin to lose the "Baby Fat" once he/she begins walking.
- Body shape changes; takes on more adult-like appearance; still appears top-heavy; abdomen protrudes, back is swayed.
Motor development

- Crawls skillfully and quickly.
- Stands alone with feet spread apart, legs stiffened, and arms extended for support.
- Gets to feet unaided.
- Most children walk unassisted near the end of this period; falls often; not always able to maneuver around obstacles, such as furniture or toys.
- Uses furniture to lower self to floor; collapses backwards into a sitting position or falls forward on hands and then sits.
- Enjoys pushing or pulling toys while walking.
- Repeatedly picks up objects and throws them; direction becomes more deliberate.
- Attempts to run; has difficulty stopping and usually just drops to the floor.
- Crawls up stairs on all fours; goes down stairs in same position.
- Sits in a small chair.
- Carries toys from place to place.
- Enjoys crayons and markers for scribbling; uses whole-arm movement.
- Helps feed self; enjoys holding spoon (often upside down) and drinking from a glass or cup; not always accurate in getting utensils into mouth; frequent spills should be expected.
- Helps turn pages in book.
- Stacks two to six objects per day.

Cognitive development

- Enjoys object-hiding activities
- Early in this period, the child always searches in the same location for a hidden object (if the child has watched the hiding of an object). Later, the child will search in several locations.
- Passes toy to other hand when offered a second object (referred to as "crossing the midline"-an important neurological development).
- Manages three to four objects by setting an object aside (on lap or floor) when presented with a new toy.
- Puts toys in mouth less often.
- Enjoys looking at picture books.
- Demonstrates understanding of functional relationships (objects that belong together): Puts spoon in bowl and then uses spoon as if eating; places teacup on saucer and sips from cup; tries to make doll stand up.
- Shows or offers toy to another person to look at.
- Names many everyday objects.
- Shows increasing understanding of spatial and form discrimination: puts all pegs in a pegboard; places three geometric shapes in large formboard or puzzle.

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• Places several small items (blocks, clothespins, cereal pieces) in a container or bottle and then dumps them out.
• Tries to make mechanical objects work after watching someone else do so.
• Responds with some facial movement, but cannot truly imitate facial expression.
• Most children with autism are diagnosed at this age.

Language

• Produces considerable "jargon": puts words and sounds together into speech-like (inflected) patterns.
• Holophrastic speech: uses one word to convey an entire thought; meaning depends on the inflection ("me" may be used to request more cookies or a desire to feed self). Later; produces two-word phrases to express a complete thought (telegraphic speech): "More cookie," "Daddy bye-bye."
• Follows simple directions, "Give Daddy the cup."
• When asked, will point to familiar persons, animals, and toys.
• Identifies three body parts if someone names them: "Show me your nose (toe, ear)."
• Indicates a few desired objects and activities by name: "Bye-bye," "cookie"; verbal request is often accompanied by an insistent gesture.
• Responds to simple questions with "yes" or "no" and appropriate head movement.
• Speech is 25 to 50 percent intelligible during this period.
• Locates familiar objects on request (if child knows location of objects).
• Acquires and uses five to fifty words; typically these are words that refer to animals, food, and toys.
• Uses gestures, such as pointing or pulling, to direct adult attention.
• Enjoys rhymes and songs; tries to join in.
• Seems aware of reciprocal (back and forth) aspects of conversational exchanges; some turn-taking in other kinds of vocal exchanges, such as making and imitating sounds.

Social

• less wary of strangers.
• Helps pick up and put away toys.
• Plays by themselves
• Enjoys being held and read to.
• Often imitates adult actions in play.
• Enjoys adult attention; likes to know that an adult is near; gives hugs and kisses.
• Recognizes self in mirror.
• Enjoys the companionship of other children, but does not play cooperatively.

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Beginning to assert independence; often refuses to cooperate with daily routines that once were enjoyable; resists getting dressed, putting on shoes, eating, taking a bath; wants to try doing things without help.
- May have a tantrum when things go wrong or if overly tired or frustrated.
- Exceedingly curious about people and surroundings; toddlers need to be watched carefully to prevent them from getting into unsafe situations.

Psychological

**Autonomy vs. Shame and Doubt (will)**

(J. Chasse, 2008) Psychosocial stimulation is vital during the toddler years. Play begins to become interactive. Toddlers begin to learn and exhibit independence, but ironically they enjoy sharing this discovery with others. Another important advancement is active social play with adults including mirroring and repeating. Songs, rhymes, and finger plays (e.g. eensy weensy spider, little teapot, etc.) are a great way to encourage and stimulate this area of development. Want attention, if not paid start throwing objects, trouble you watching TV. Scared from dark, start crying loudly under the situation.

**Two year old**

**Physical**

- Posture is more erect; abdomen still large and protruding, back swayed, because abdominal muscles are not yet fully developed.
- Respirations are slow and regular
- Body temperature continues to fluctuate with activity, emotional state, and environment.
- Brain reaches about 80 percent of its adult size.
- 15 baby teeth almost finished growing out

**Motor development**

- Can walk around obstacles and walk more erect
- Squats for long periods while playing.
- Climbs stairs unassisted (but not with alternating feet).
- Balances on one foot (for a few moments), jumps up and down, but may fall.
- Often achieves toilet training during this year (depending on child’s physical and neurological development) although accidents should still be expected; the child will indicate readiness for toilet training.
- Throws large ball underhand without losing balance. Holds small cup or tumbler in one hand. Unbuttons large buttons; unzips large zippers.
- Opens doors by turning doorknobs.
- Grasps large crayon with fist; scribbles.
- Climbs up on chair, turns, and sits down.
- Stacks four to six objects on top of one another.
- Uses feet to propel wheeled riding toys.

**Cognitive**

- Eye-hand movements better coordinated; can put objects together, take them apart; fit large pegs into pegboard.
- Begins to use objects for purposes other than intended (may push a block around as a boat).
- Does simple classification tasks based on single dimension (separates toy dinosaurs from toy cars).
- Seems fascinated by, or engrossed in, figuring out situations: where the tennis ball rolled, where the dog went, what caused a particular noise.
- Attends to self-selected activities for longer periods of time. Discovering cause and effect: squeezing the cat makes her scratch.
- Knows where familiar persons should be; notes their absence; finds a hidden object by looking in last hiding place first. (This is what Piaget termed object permanence, which usually occurs during the sensorimotor stage of Piaget’s childhood theory of cognitive development)
- Names familiar objects.
- Recognizes, expresses, and locates pain.
- Expected to use "magical thinking", such as believing a toy bear is a real bear.
- Tells about objects and events not immediately present (this is both a cognitive and linguistic advance).
- Expresses more curiosity about the world.

**Language**

- Enjoys participating while being read to.
- Realizes language is effective for getting desired responses.
- Uses fifty to three-hundred words; vocabulary continuously increasing.
- Has broken the linguistic code; in other words, much of a two-year-old’s talk has meaning to him or her.
- Receptive language is more developed than expressive language; most two-year olds understand significantly more than they can talk about.
- Utters three- and four-word statements; uses conventional word order to form more complete sentences.
- Refers to self as "me" or sometimes "I" rather than by name: "Me go bye-bye"; has no trouble verbalizing "mine."
- Expresses negative statements by tacking on a negative word such as "no" or "not": "Not more milk."
- Uses some plurals.

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Some stammering and other dysfluencies are common.
Speech is as much as 65 to 70 percent intelligible.
Is able to verbalize needs.

**Social and emotional**

- Shows signs of empathy and caring; comforts another child if hurt or frightened; appears to sometimes be overly affectionate in offering hugs and kisses to children
- Continues to use physical aggression if frustrated or angry (for some children, this is more exaggerated than for others); Physical aggression usually lessens as verbal skills improve.
- Temper tantrums likely to peak during this year; extremely difficult to reason with during a tantrum.
- Impatient; finds it difficult to wait or take turns.
- Enjoys "helping" with household chores; imitates everyday activities: may try to toilet a stuffed animal, feed a doll.
- "Bossy" with parents and caregivers; orders them around, makes demands, expects immediate compliance from adults.
- Watches and imitates the play of other children, but seldom interacts directly; plays near others, often choosing similar toys and activities (parallel play); solitary play is often simple and repetitive.
- Offers toys to other children, but is usually possessive of playthings; still tends to hoard toys.
- Making choices is difficult; wants it both ways.
- Often defiant; shouting "no" becomes automatic.
- Ritualistic; wants everything "just so"; routines carried out exactly as before; belongings placed "where they belong."

**Three year old**

**Physical**

- Growth is steady though slower than in first two years.
- Adult height can be predicted from measurements of height at three years of age; males are approximately 53% of their adult height and females, 57%.
- Legs grow faster than arms,
- Circumference of head and chest is equal; head size is in better proportion to the body.
- "Baby fat" disappears as neck appears.
- Posture is more erect; abdomen no longer protrudes.
- Slightly knock-kneed.
- can jump from low step
- can stand up and walk around on tiptoes

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"baby" teeth stage over.
- Needs to consume approximately 6,300 J (1,500 calories) daily.

**Motor development**

- Walks up and down stairs unassisted, using alternating feet; may jump from bottom step, landing on both feet.
- Can walk on one foot, balance momentarily.
- Can kick big ball-shaped objects.
- Needs minimal assistance eating.
- Jumps on the spot.
- Pedals a small tricycle.
- Throws a ball overhand; aim and distance are limited.
- Catches a large bounced ball with both arms extended.
- Enjoys swinging on a swing (not too high or too fast).
- Shows improved control of crayons or markers; uses vertical, horizontal and circular strokes.
- Holds crayon or marker between first two fingers and thumb (tripod grasp), not in a fist as earlier.
- Can turn pages of a book one at a time
- Enjoys building with blocks.
- Builds a tower of eight or more blocks.
- Enjoys playing with clay; pounds, rolls, and squeezes it.
- May begin to show hand dominance.
- Carries a container of liquid, such as a cup of milk or bowl of water, without much spilling; pours liquid from pitcher into another container.
- Manipulates large buttons and zippers on clothing.
- Washes and dries hands; brushes own teeth, but not thoroughly.
- Usually achieves complete bladder control during this time.

**Cognitive development**

- Listens attentively to age-appropriate stories.
- Makes relevant comments during stories, especially those that relate to home and family events.
- Likes to look at books and may pretend to "read" to others or explain pictures.
- Enjoys stories with riddles, guessing, and "suspense."
- Speech is understandable most of the time.
- Produces expanded noun phrases: "big, brown dog."
- Produces verbs with "ing" endings; uses "-s" to indicate more than one; often puts "-s" on already pluralized forms: geese, mice.
- Indicates negatives by inserting "no" or "not" before a simple noun or verb phrase: "Not baby."

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Answers "What are you doing?", "What is this?", and "Where?" questions dealing with familiar objects and events.

Four year old

Physical Development

- Head circumference is usually not measured after age three.
- Requires approximately 1,700 calories daily.
- Hearing acuity can be assessed by child’s correct usage of sounds and *Language also, by the child’s appropriate responses to questions and instructions.

Motor Development

- Walks a straight line (tape or chalk line on the floor).
- Hops on one foot.
- Pedals and steers a wheeled toy with confidence; turns corners, avoids obstacles and oncoming "traffic."
- Climbs ladders, trees, playground equipment.
- Jumps over objects 12 to 15 cm (5 to 6 in) high; lands with both feet together.
- Runs, starts, stops, and moves around obstacles with ease.
- Throws a ball overhand; distance and aim improving.
- Builds a tower with ten or more blocks.
- Forms shapes and objects out of clay: cookies, snakes, simple animals.
- Reproduces some shapes and letters.
- Holds a crayon or marker using a tripod grasp.
- Paints and draws with purpose; may have an idea in mind, but often has problems implementing it so calls the creation something else.
- Becomes more accurate at hitting nails and pegs with hammer.
- Threads small wooden beads on a string.
- Can run in a circle

Cognitive

- Can recognize that certain words sound similar
- Names eighteen to twenty uppercase letters. Writes several letters and sometimes their name.
- A few children are beginning to read simple books, such as alphabet books with only a few words per page and many pictures.
- Likes stories about how things grow and how things operate.
- Delights in wordplay, creating silly Language.
- Understands the concepts of "tallest," "biggest," "same," and "more"; selects the picture that has the "most houses" or the "biggest dogs."

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Rote counts to 20 or more.
Understands the sequence of daily events: "When we get up in the morning, we get dressed, have breakfast, brush our teeth, and go to school."
When looking at pictures, can recognize and identify missing puzzle parts (of person, car, animal).
Very good storytellers.
Counts 1 to 7 objects out loud, but not always in order
follows two to three step directions given individually or in a group
may put the "ed" on the end of words such as "I goed outside and I played."

Language

Uses the prepositions "on," "in," and "under."
Uses possessives consistently: "hers," "theirs," "baby's."
Answers "Whose?", "Who?", "Why?", and "How many?"
Produces elaborate sentence structures: "The cat ran under the house before I could see what color it was."
Speech is almost entirely intelligible.
Begins to correctly use the past tense of verbs: "Mommy closed the door," "Daddy went to work."
Refers to activities, events, objects, and people that are not present.
Changes tone of voice and sentence structure to adapt to listener's level of understanding: To baby brother, "Milk gone?" To Mother, "Did the baby drink all of his milk?"
States first and last name, gender, siblings' names, and sometimes own telephone number.
Answers appropriately when asked what to do if tired, cold, or hungry. Recites and sings simple songs and rhymes.

Social development

Outgoing; friendly; overly enthusiastic at times.
Moods change rapidly and unpredictably; laughing one minute, crying the next; may throw tantrum over minor frustrations (a block structure that will not balance); sulk over being left out.
Imaginary playmates or companions are common; holds conversations and shares strong emotions with this invisible friend.
Boasts, exaggerates, and "bends" the truth with made-up stories or claims of boldness; tests the limits with "bathroom" talk.
Cooperates with others; participates in group activities.
Shows pride in accomplishments; seeks frequent adult approval.
Often appears selfish; not always able to take turns or to understand taking turns under some conditions; tattles on other children.
- Insists on trying to do things independently, but may get so frustrated as to verge on tantrums when problems arise: paint that drips, paper airplane that will not fold right.
- Enjoys role-playing and make-believe activities.
- Relies (most of the time) on verbal rather than Physical aggression; may yell angrily rather than hit to make a point; threatens: "You can't come to my birthday party!"
- Name-calling and taunting are often used as ways of excluding other children.
- Establishes close relationships with playmates; beginning to have "best" friends.

**Five year old**

**Physical**

- Head size is approximately that of an adult's.
- May begin to lose "baby" (deciduous) teeth.
- Body is adult-like in proportion.
- Requires approximately 7,500 J (1,800 calories) daily
- Visual tracking and binocular vision are well developed.

**Motor development**

- Walks backwards, toe to heel.
- Walks unassisted up and down stairs, alternating feet.
- May learn to turn somersaults (should be taught the right way in order to avoid injury).
- Can touch toes without flexing knees.
- Walks a balance beam.
- Learns to skip using alternative feet.
- Catches a ball thrown from 1 m (3.3 ft) away.
- Rides a tricycle or wheeled toy with speed and skillful steering; some children learning to ride bicycles, usually with training wheels.
- Jumps or hops forward ten times in a row without falling.
- Balances on either foot with good control for ten seconds.
- Builds three-dimensional structures with small cubes by copying from a picture or model.
- Demonstrates fair control of pencil or marker; may begin to color within the lines.
- Cuts on the line with scissors (not perfectly).
- Hand dominance is fairly well established.
Cognitive

- Forms rectangle from two triangular cuts.
- Builds steps with set of small blocks.
- Understands concept of same shape, same size.
- Sorts objects on the basis of two dimensions, such as color and form.
- Sorts a variety of objects so that all things in the group have a single common feature (classification skill: all are food items or boats or animals).
- Understands the concepts of smallest and shortest; places objects in order from shortest to tallest, smallest to largest.
- Identifies objects with specified serial position: first, second, last.
- Rote counts to 20 and above; many children count to 100.
- Recognizes numerals from 1 to 10.
- Understands the concepts of less than: "Which bowl has less water?"
- Understands the terms dark, light, and early: "I got up early, before anyone else. It was still dark."
- Relates clock time to daily schedule: "Time to turn on TV when the little hand points to 5."
- Some children can tell time on the hour: five o’clock, two o’clock.
- Knows what a calendar is for.
- Recognizes and identifies coins; beginning to count and save money.
- Many children know the alphabet and names of upper- and lowercase letters.
- Understands the concept of half; can say how many pieces an object has when it’s been cut in half.
- Eager to learn new things.

Language development

- Vocabulary of 1,500 words plus.
- Tells a familiar story while looking at pictures in a book.
- Defines simple words by function: a ball is to bounce; a bed is to sleep in.
- Identifies and names four to eight colours.
- Recognizes the humor in simple jokes; makes up jokes and riddles.
- Produces sentences with five to seven words; much longer sentences are not unusual.
- States the name of own city or town, birthday, and parents’ names.
- Answers telephone appropriately; calls person to phone or takes a brief message.
- Speech is almost entirely grammatically correct.
- Uses "would" and "could" appropriately.
- Uses past tense of irregular verbs consistently: "went," "caught," "swam."
- Uses past-tense inflection (-ed) appropriately to mark regular verbs: "jumped," "rained," "washed."

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Social development

- Enjoys and often has one or two focus friendships.
- Plays cooperatively (can lapse), is generous, takes turns, shares toys.
- Participates in group play and shared activities with other children; suggests imaginative and elaborate play ideas.
- Shows affection and caring towards others especially those “below” them or in pain.
- Generally subservient to parent or caregiver requests.
- Needs comfort and reassurance from adults but is less open to comfort.
- Has better self-control over swings of emotions.
- Likes entertaining people and making them laugh.
- Boasts about accomplishments.

Six year old

Physical

- Weight gains reflect significant increases in muscle mass.
- Heart rate and respiratory rates are close to adults.
- Body may appear lanky as through period of rapid growth.
- Baby teeth beginning to be replaced by permanent ones, starting with the two lower front teeth.
- 20/20 eyesight; if below 20/40 should see a professional.
- The most common vision problem during middle childhood is myopia, or nearsightedness. (Berk, 2007).
- Uses 6,700 J to 7,100 J (1,600 to 1,700 calories) a day.

Motor development

- Gains greater control over large and fine motor skills; movements are more precise and deliberate, though some clumsiness persists.
- Enjoys vigorous running, jumping, climbing, and throwing est.
- Has trouble staying still.
- Span of attention increases; works at tasks for longer periods of time, though
- Can concentrate effort but not always consistently.
- Understands time (today, tomorrow, yesterday) and simple motion (things go faster than others).
- Recognizes seasons and major activities done in the times.
- Has fun with problem solving and sorting activities like stacking, puzzles and mazes.
Psychology for IAS: Development of Human Behavior

- Enjoys the challenge of puzzles, counting and sorting activities, paper-and-pencil mazes, and games that involve matching letters and words with pictures.
- Recognizes some words by sight; attempts to sound out words
- In some cases the child may be reading well.
- functioning which facilitates learning to ride a bicycle, swim, swing a bat, or kick a ball.
- Making things is enjoyed.
- Reverses or confuse certain letters: b/d, p/g, g/q, t/f.
- Able to trace objects.
- Folds and cuts paper into simple shapes.
- Can Tie Laces, string (like shoes).

Language

- Can identify right and left hands fairly consistently.
- Holds onto positive beliefs involving the unexplainable (magic or fantasy)
- Arrives at some understanding about death and dying; expresses fear that parents may die.
- Talks a lot.
- Loves telling jokes and riddles; often, the humor is far from subtle.
- Experiments with slang and profanity and finds it funny.
- Enthusiastic and inquisitive about surroundings and everyday events.
- Able to carry on adult-like conversations; asks many questions.
- Learns 5 to 10 words a day; vocabulary of 10,000–14,000.
- Uses appropriate verb tenses, word order, and sentence structure.

Social and emotional

- Uses language rather than tantrums or physical aggression to express displeasure: "That's mine! Give it back, you dummy."
- Talks self through steps required in simple problem-solving situations (though the "logic" may be unclear to adults).
- Has mood swings towards primary caregiver depending on the day
- Friendship with parent is less depended on but still needs closeness and nurturing.
- Anxious to please; needs and seeks adult approval, reassurance, and praise; may complain excessively about minor hurts to gain more attention.
- Often can’t view the world from another’s point of view
- Self-perceived failure can make the child easily disappointed and frustrated.
- Can’t handle things not going their own way
- Does not understand ethical behavior or moral standards especially when doing things that have not been given rules

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- Understands when he or she has been thought to be "bad"; values are based on others enforced values.
- May be increasingly fearful of the unknown like things in the dark, noises, and animals.

**Attachment in children**

**Mother and child**

Newborn humans infants cannot survive without a caregiver to provide food and protection, and will not thrive without other types of support as well. While infants have relatively few inborn behaviors—such as crying, rooting, and sucking—they also come with many behavioral systems ready to be activated through interaction with another person. In their first year babies brains double in volume and their experiences will be hardwired in as a foundation on which to build their lives. The deep bond which babies form with their primary caregiver is called Attachment, the foundation on which all other close, long-term relationships will be built.

Attachment theory studies and describes this first relationship; it’s an interdisciplinary study that includes developmental psychology and ethology (behavioral biology). Attachment is found in all mammals to some degree, especially nonhuman primates. See discussion page.

Attachment in children is a theory of attachment between children and their caregivers specifically addressing the behaviors and emotions that children direct toward familiar adults. It is primarily an evolutionary and ethological theory postulating that infants seek proximity to a specified attachment figure in situations of distress or alarm for the purpose of survival.

Attachment theory has led to a new understanding of child development. Children develop different styles of attachment based on experiences and interactions with their caregivers. Four different attachment styles or patterns have been identified in children: secure attachment, anxious-ambivalent attachment, anxious-avoidant attachment, and disorganized attachment. Attachment theory has become the dominant theory used today in the study of infant and toddler behavior and in the fields of infant mental health, treatment of children, and related fields.

**Attachment theory and children**

Attachment theory (Bowlby 1969, 1973, 1980) is rooted in the ethological notion that a newborn child is biologically programmed to seek proximity with caregivers, and this proximity-seeking behavior is naturally selected. Through repeated attempts to seek physical and emotional closeness with a caregiver and the responses the child gets, the child develops an internal working model (IWM) of the

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self and others that reflects the response of the caregiver to the child. According to Bowlby, attachment provides a secure base from which the child can explore the environment, a haven of safety to which the child can return when he or she is afraid or fearful.

An infant may have different patterns of attachment with different care-givers. By around age five years, this "crystalizes" into one pattern of attachment that is generally exhibited within most relationships.

**Attachment classification in children: The Strange Situation Protocol**

The most common and empirically supported method for assessing attachment in infants (12 months-20 months) is the Strange Situation Protocol, developed by Mary Ainsworth as a result of her careful in-depth observations of infants with their mothers in Uganda (see below). The Strange Situation Protocol is a research, not a diagnostic, tool and the resulting attachment classifications are not 'clinical diagnoses.' While the procedure may be used to supplement clinical impressions, the resulting classifications should not be confused with the clinically diagnosed 'Reactive Attachment Disorder (RAD).’ The clinical concept of RAD differs in a number of fundamental ways from the theory and research driven attachment classifications based on the Strange Situation Procedure. The idea that insecure attachments are synonymous with RAD is, in fact, not accurate and leads to ambiguity when formally discussing attachment theory as it has evolved in the research literature. This is not to suggest that the concept of RAD is without merit, but rather that the clinical and research conceptualizations of insecure attachment and attachment disorder are not synonymous.

The 'Strange Situation' is a laboratory procedure used to assess infant patterns of attachment to their caregiver. In the procedure, the mother and infant are placed in an unfamiliar playroom equipped with toys while a researcher observes/records the procedure through a one-way mirror. The procedure consists of eight sequential episodes in which the child experiences both separation from and reunion with the mother as well as the presence of an unfamiliar stranger. The protocol is conducted in the following format unless modifications are otherwise noted by a particular researcher:

- **Episode 1:** Mother (or other familiar caregiver), Baby, Experimenter (30 seconds)
- **Episode 2:** Mother, Baby (3 mins)
- **Episode 3:** Mother, Baby, Stranger (3 mins or less)
- **Episode 4:** Stranger, Baby (3 mins)
- **Episode 5:** Mother, Baby (3 mins)
- **Episode 6:** Baby Alone (3 mins or less)
- **Episode 7:** Stranger, Baby (3 mins or less)
- **Episode 8:** Mother, Baby (3 mins)

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On the basis of predominately their reunion behaviours (although other behaviors are taken into account) in the Strange Situation Paradigm (Ainsworth et al., 1978; see below), infants can be categorized into three 'organized' attachment categories: Secure (Group B); Avoidant (Group A); and Anxious/Resistant (Group C). There are subclassifications for each group (see below). A fourth category, termed Disorganized (D), can also be assigned to an infant assessed in the Strange Situation although a primary 'organized' classification is always given for an infant judged to be disorganized. Each of these groups reflects a different kind of attachment relationship with the mother. A child may have a different type of attachment to each parent as well as to unrelated caregivers. Attachment style is thus not so much a part of the child's thinking, but is characteristic of a specific relationship. However, after about age four the child exhibits one primary consistent pattern of attachment in relationships.

**Attachment patterns**

**Secure attachment**

A toddler who is securely attached to its parent (or other familiar caregiver) will explore freely while the caregiver is present, typically engages with strangers, is often visibly upset when the caregiver departs, and is generally happy to see the caregiver return. The extent of exploration and of distress are affected by the child’s temperamental make-up and by situational factors as well as by attachment status, however.

In the traditional Ainsworth et al. (1978) coding of the Strange Situation, secure infants are denoted as "Group B" infants and they are further subclassified as B1, B2, B3, and B4. Although these subgroupings refer to different stylistic responses to the comings and goings of the caregiver, they were not given specific labels by Ainsworth and colleagues, although their descriptive behaviors led others (including students of Ainsworth) to devise a relatively 'loose' terminology for these subgroups. B1's have been referred to as 'secure-reserved', B2's as 'secure-inhibited', B3's as 'secure-balanced,' and B4's as 'secure-reactive.' In academic publications however, the classification of infants (if subgroups are denoted) is typically simply "B1" or "B2" although more theoretical and review-oriented papers surrounding attachment theory may use the above terminology.

Securely attached children are best able to explore when they have the knowledge of a secure base to return to in times of need. When assistance is given, this bolsters the sense of security and also, assuming the parent's assistance is helpful, educates the child in how to cope with the same problem in the future. Therefore, secure attachment can be seen as the most adaptive attachment style. According to some psychological researchers, a child becomes securely attached when the parent is
available and able to meet the needs of the child in a responsive and appropriate manner. Others have pointed out that there are also other determinants of the child’s attachment, and that behavior of the parent may in turn be influenced by the child’s behavior.

**Anxious-resistant insecure attachment**

In general, a child with an anxious-resistant attachment style will typically explore little (in the Strange Situation) and is often wary of strangers, even when the parent is present. When the mother departs, the child is often highly distressed. The child is generally ambivalent when she returns. In the traditional Ainsworth et al. (1978) coding of the Strange Situation, anxious-resistant infants are denoted as "Group C" infants and they are further subclassified into C1 and C2 infants. C1 infants are so judged when:

"...resistant behavior is particularly conspicuous. The mixture of seeking and yet resisting contact and interaction has an unmistakeably angry quality and indeed an angry tone may characterize behavior in the preseparation episodes..."

C2 infants are often seen as demonstrating 'passive' resistance. As Ainsworth et al. (1978) originally noted:

"Perhaps the most conspicuous characteristic of C2 infants is their passivity. Their exploratory behavior is limited throughout the SS and their interactive behaviors are relatively lacking in active initiation. Nevertheless, in the reunion episodes they obviously want proximity to and contact with their mothers, even though they tend to use signalling rather than active approach, and protest against being put down rather than actively resisting release...In general the C2 baby is not as conspicuously angry as the C1 baby."

**Anxious-avoidant insecure attachment**

In general, a child with an anxious-avoidant attachment style will avoid or ignore the parent when he or she returns (in the Strange Situation) - showing little overt indications of an emotional response. Often, the stranger will not be treated much differently from the parent. In the traditional Ainsworth et al. (1978) coding of the Strange Situation, anxious-avoidant infants are denoted as "Group A" infants and they are further subclassified into A1 and A2 infants. A1 infants are so judged when there is:

"...conspicuous avoidance of the mother in the reunion episodes which is likely to consist of ignoring her altogether, although there may be some pointed looking away, turning away, or moving away...If there is a greeting when the mother enters, it tends to be a mere look or a smile...Either the baby does not approach his mother..."
upon reunion, or they approach in 'abortive' fashions with the baby going past the mother, or it tends to only occur after much coaxing...If picked up, the baby shows little or no contact-maintaining behavior; he tends not to cuddle in; he looks away and he may squirm to get down."

A2 infants are often seen as demonstrating a mixture of both some avoidance and resistance. Often, though not always, A2 infants are judged Disorganized (D). As Ainsworth et al. (1978) originally noted:

"...[the A2 infant] shows a mixed response to mother on reunion, with some tendency to greet and approach, intermingled with a marked tendency to move or turn away from her, move past her, aver the gaze from her, or ignore her...there may be moderate proximity-seeking, combined with strong proximity-avoiding...If picked up, the baby may cling momentarily; if put down, he may protest or resist momentarily; but there is also a tendency to squirm to be put down, to turn the face away when being held and other signs of mixed feelings [i.e., resistance/ambivalence]."

**Disorganized attachment**

A fourth category termed disorganized attachment (Main & Solomon, 1990) was subsequently identified and empiricized when a sizeable number of infants defied classification in terms of Ainsworth's original tripartite classification scheme. It can be conceptualized as the lack of a coherent 'organized' behavioral strategy for dealing with the stresses (i.e., the strange room, the stranger, and the comings and goings of the caregiver) of the Strange Situation Procedure. Evidence from Main et al. has suggested that children with disorganized attachment may experience their caregivers as either frightening or frightened. A frightened caregiver is alarming to the child, who uses social referencing techniques such as checking the adult’s facial expression to ascertain whether a situation is safe. A frightening caregiver is usually so via aggressive behaviors towards the child (either mild or direct physical/sexual behaviors) and puts the child in a dilemma which Main and colleagues have called 'fear without solution.' In other words, the caregiver is both the source of the child’s alarm as well as the child's haven of safety. Through parental behaviors that are frightening, the caregiver puts the child in an irresolvable paradox of approach-avoidance. This paradox, in fact, may be one explanation for some of the 'stilling' and 'freezing' behaviors observed in children judged to be disorganized. Human interactions are experienced as erratic, thus children cannot form a coherent, organized interactive template. If the child uses the caregiver as a mirror to understand the self, the disorganized child is looking into a mirror broken into a thousand pieces. It is more severe than learned helplessness as it is the model of the self rather than of a situation. It is important to note that when a child is judged disorganized, he or she is given a secondary best-fitting 'organized' (i.e., secure, ambivalent, avoidant) classification as well. This reflects the fact that attachment

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disorganization is thought to be a breakdown of an inchoate organized attachment strategy. The degree to which the organized strategy is fragmented however is often different in degree across infants judged to receive a primary 'disorganized' classification.

There is a growing body of research on the links between abnormal parenting, disorganized attachment and risks for later psychopathologies. Abuse is associated with disorganized attachment. The disorganized style is a risk factor for a range of psychological disorders although it is not in itself considered an attachment disorder under the current classification.

**Significance of patterns**

Research based on data from longitudinal studies, such as the National Institute of Child Health and Human Development Study of Early Child Care and the Minnesota Study of Risk and Adaption from Birth to Adulthood, and from cross-sectional studies, consistently shows associations between early attachment classifications and peer relationships as to both quantity and quality. Predictions are stronger for close relationships than for less intimate ones. Secure children have more positive and fewer negative peer reactions and establish more and better friendships. Insecure children tend to be followers rather than leaders. Insecure-ambivalent children have a tendency to anxiously but unsuccessfully seek positive peer interaction whereas insecure-avoidant children appear aggressive and hostile and may actively repudiate positive peer interaction. There is no established direct association between early experience and a comprehensive measure of social functioning in early adulthood but early experience significantly predicts early childhood representations of relationships, which in turn predicts later self and relationship representations and social behaviour. Behavioural problems and social competence in insecure children increase or decline with deterioration or improvement in quality of parenting and the degree of risk in the family environment. Avoidant children are especially vulnerable to family risk. However an early secure attachment appears to have a lasting protective function.

**Criticism**

**Michael Rutter describes the procedure in the following terms:**

**Father and child**

"It is by no means free of limitations (see Lamb, Thompson, Gardener, Charnov & Estes, 1984). To begin with, it is very dependent on brief separations and reunions having the same meaning for all children. This maybe a major constraint when applying the procedure in cultures, such as that in Japan (see Miyake et al., 1985), where infants are rarely separated from their mothers in ordinary circumstances.

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Also, because older children have a cognitive capacity to maintain relationships when the older person is not present, separation may not provide the same stress for them. Modified procedures based on the Strange Situation have been developed for older preschool children (see Belsky et al., 1994; Greenberg et al., 1990) but it is much more dubious whether the same approach can be used in middle childhood. Also, despite its manifest strengths, the procedure is based on just 20 minutes of behaviour. It can be scarcely expected to tap all the relevant qualities of a child’s attachment relationships. Q-sort procedures based on much longer naturalistic observations in the home, and interviews with the mothers have developed in order to extend the database (see Vaughn & Waters, 1990). A further constraint is that the coding procedure results in discrete categories rather than continuously distributed dimensions. Not only is this likely to provide boundary problems, but also it is not at all obvious that discrete categories best represent the concepts that are inherent in attachment security. It seems much more likely that infants vary in their degree of security and there is need for a measurement systems that can quantify individual variation”.

**Ecological validity and universality of Strange Situation attachment classification distributions**

With respect to the ecological validity of the Strange Situation, a meta-analysis of 2,000 infant-parent dyads, including several from studies with non-Western language and/or cultural bases, found the global distribution of attachment categorizations to be A (21%), B (65%), and C (14%). This global distribution was generally consistent with Ainsworth et al.’s (1978) original attachment classification distributions.

However, controversy has been raised over a few cultural differences in these rates of ‘global’ attachment classification distributions. In particular, two studies diverged from the global distributions of attachment classifications noted above. One study was conducted in North Germany in which more avoidant (A) infants were found than global norms would suggest, and the other in Sapporo, Japan, where more resistant (C) infants were found. Of these two studies, the Japanese findings have sparked the most controversy as to the meaning of individual differences in attachment behavior as originally identified by Ainsworth et al. (1978).

In a recent study conducted in Sapporo, Behrens et al. (2007) found attachment distributions consistent with global norms using the six-year Main & Cassidy scoring system for attachment classification. In addition to these findings supporting the global distributions of attachment classifications in Sapporo, Behrens et al. also discuss the Japanese concept of amae and its relevance to questions concerning whether the insecure-resistant (C) style of interaction may be engendered in Japanese infants as a result of the cultural practice of amae.
Van IJzendoorn and Kroonenberg conducted a meta-analysis of various countries, including Japan, Israel, Germany, China, the UK and the USA using the Strange Situation. The research showed that though there were cultural differences, the three basic patterns, secure, avoidant and ambivalent, can be found in every culture in which studies have been undertaken, even where communal sleeping arrangements are the norm. Selection of the secure pattern is found in the majority of children across cultures studied. This follows logically from the fact that attachment theory provides for infants to adapt to changes in the environment, selecting optimal behavioural strategies. How attachment is expressed shows cultural variations which need to be ascertained before studies can be undertaken.

**Attachment measurement: discrete or continuous?**

Regarding the issue of whether the breadth of infant attachment functioning can be captured by a categorical classification scheme, it should be noted that continuous measures of attachment security have been developed which have demonstrated adequate psychometric properties. These have been used either individually or in conjunction with discrete attachment classifications in many published reports (see Richters et al., 1998; Van IJzendoorn et al., 1990). The original Richter’s et al. (1998) scale is strongly related to secure versus insecure classifications, correctly predicting about 90% of cases. Readers further interested in the categorical versus continuous nature of attachment classifications (and the debate surrounding this issue) should consult a paper by Fraley and Spieker and the rejoinders in the same issue by many prominent attachment researchers including J. Cassidy, A. Sroufe, E. Waters & T. Beauchaine, and M. Cummings.

**Adolescent psychology**

Adolescent psychology addresses the psychological issues and interests of adolescents.

**Adolescence**

Adolescence, the transitional stage of development between childhood and adulthood, represents the period of time during which a person experiences a variety of biological changes and encounters a number of emotional issues. The ages which are considered to be part of adolescence vary by culture, and ranges from preteens to early twenties. According to the World Health Organization (WHO), adolescence covers the period of life between 10 and 20 years of age. Adolescence is often divided by psychologists into three distinct phases: early, mid, and late adolescence.

**Background**

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Adolescence can be a specifically turbulent as well as a dynamic period of one's life. It has been identified as a period in which young people develop abstract thinking abilities, become more aware of their sexuality, develop a clearer sense of psychological identity, and increase their independence from parents. G. Stanley Hall denoted this period as one of "Storm and Stress" and, according to him, conflict at this developmental stage is normal and not unusual. Margaret Mead, on the other hand, attributed the behavior of adolescents to their culture and upbringing, as the majority of problems associated with adolescence in western society are not present in other cultures.

Several developmental stage models have placed adolescence in a period of human development. Sigmund Freud saw it as the "genital phase" of psychosexual development, where the child recaptures the sexual awareness of infancy. Jean Piaget focused on cognitive development, seeing adolescence as the "formal operative stage" where the young person develops the ability to think abstractly and draw conclusions from the information available. Erik Erikson's theory of psychosocial development identified the identity crisis as central to the notion of adolescence.

Adolescent psychology addresses the issues associated with adolescence, such as whether or not the aforementioned "storm and stress" is a normal part of this period. The American Psychological Association has a separate division dedicated to adolescence, and the psychologists specializing in this topic attempt to answer questions dealing with the age group. One issue in adolescent psychology discusses whether adolescence is in fact a discrete developmental period, a point along a continuum of human development, or a social construction.

**Social behavior patterns**

The social behavior of mammals changes as they enter adolescence. In humans, adolescents typically increase the amount of time spent with their peers. Nearly eight hours are usually spent communicating with others, but only eight percent of this time is spent talking to adults. Adolescents report that they are far happier spending time with similarly-aged peers as compared to adults. Consequently, conflict between adolescents and their parents increase at this time as adolescents strive to create a separation and sense of independence. These interactions are not always positive; peer pressure is very prevalent during adolescence, leading to increases in cheating and misdemeanor crime. Young adolescents are particularly susceptible to conforming to the behavior of their peers.

Early adolescence is a stage at which the peer group becomes increasingly important, with conformity to peers peaking at 11–13 years (Costanzo and Shaw 1966). 90% of adolescents identify themselves with a peer group (Palmonari, 1989). According to Judith Rich Harris's theory of group socialization, children and

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adolescents are shaped more by their peers than their parents (Harris 1997). Peers can encourage both prosocial behavior, which peaks at 11–12 years, or anti-social behavior, which peaks at 14–15 years (Bendt, 1979). Adolescents are less likely to feel depressed or anxious if the peer group provides emotional support (Buhrmester, 1992). Arguments between parents and children increase considerably during adolescence (Feeney, 1999). However, adolescents with few or no close friends are closer to their parents and are less likely to be subject to peer pressure.

Non-human mammals also exhibit changes in social attitude during adolescence. Adolescent rodents have also been observed spending more of their time with rodents of similar age. Conflicts between adolescents and parents have been noted in other primates, and overall increases in aggressiveness have been observed during this time period. Despite this, social bonding between adolescents and adults tends to improve due to reconciliatory behavior. Allomaternal behavior increases among females in several species, including humans, nonhuman primates, and rodents. However, males tend to exhibit less interest in infants during adolescence.

**Psychological issues**

Adolescents are widely considered by the psychological establishment to be prone to recklessness and risk-taking behaviors, which can lead to substance abuse, car accidents, unsafe sex, and youth crime. There is some evidence that this risk-taking is biologically driven, caused by the social and emotional part of the brain (amygdala) developing faster than the cognitive-control part of the brain (frontal cortex).

Although most adolescents are psychologically healthy, they can (like adults) exhibit signs of mental illness. Late adolescence and early adulthood are peak years for the onset of schizophrenia. Mood disorders such as clinical depression, bipolar disorder, and anxiety disorders can initially show in adolescence. For example, girls aged between 15 and 19 make up 40% of anorexia nervosa cases.

**Nature versus nurture**

The nature versus nurture debate concerns the relative importance of an individual's innate qualities ("nature," i.e. nativism, or innatism) versus personal experiences ("nurture," i.e. empiricism or behaviorism) in determining or causing individual differences in physical and behavioral traits.

"Nature versus nurture" in its modern sense was coined by the English Victorian polymath Francis Galton in discussion of the influence of heredity and environment on social advancement, although the terms had been contrasted previously, for example by Shakespeare (in his play, The Tempest: 4.1). Galton was influenced by

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the book On the Origin of Species written by his cousin, Charles Darwin. The concept embodied in the phrase has been criticized for its binary simplification of two tightly interwoven parameters, as for example an environment of wealth, education and social privilege are often historically passed to genetic offspring.

The view that humans acquire all or almost all their behavioral traits from "nurture" was termed by philosopher John Locke tabula rasa ("blank slate") and proposes that humans develop from only environmental influences. This question was once considered to be an appropriate division of developmental influences, but since both types of factors are known to play such interacting roles in development, most modern psychologists and anthropologists consider the question naive—representing an outdated state of knowledge.

In the social and political sciences, the nature versus nurture debate may be contrasted with the structure versus agency debate (i.e. socialization versus individual autonomy). For a discussion of nature versus nurture in language and other human universals, see also psychological nativism.

**Scientific approach**

To disentangle the effects of genes and environment, behavioral geneticists perform adoption and twin studies. These seek to decompose the variance (differences) in a population into genetic and environmental components. This move from individuals to populations makes a critical difference in the way we think about nature and nurture. This difference is perhaps highlighted in the quote attributed to Psychologist Donald Hebb who is said to have once answered a journalist's question of "which, nature or nurture, contributes more to personality?" by asking in response, "Which contributes more to the area of a rectangle, its length or its width?" For a particular rectangle, its area is indeed the product of its length and width. Moving to a population, however, this analogy masks the fact that there are many individuals, and that it is meaningful to talk about their differences. Thus if a game such as soccer defined the width of a playing field very tightly, but left the length unspecified, then differences in the area of the playing fields would be almost entirely due to differences in length.

Scientific approaches also seek to break down variance beyond these two categories of nature and nurture. Thus rather than "nurture", behavior geneticists distinguish shared family factors (i.e., those shared by siblings, making them more similar) and nonshared factors (i.e., those that uniquely affect individuals, making siblings different). To express the portion of the variance due to the "nature" component, behavioral geneticists generally refer to the heritability of a trait.

With regard to the Big Five personality traits as well as adult IQ in the general U.S. population, the portion of the overall variance that can be attributed to shared
family effects is often negligible. On the other hand, most traits are thought to be at least partially heritable. In this context, the "nature" component of the variance is generally thought to be more important than that ascribed to the influence of family upbringing.

In her Pulitzer Prize-nominated book The Nurture Assumption, author Judith Harris argues that "nurture," as traditionally defined in terms of family upbringing does not effectively explain the variance for most traits (such as adult IQ and the Big Five personality traits) in the general population of the United States. On the contrary, Harris suggests that either peer groups or random environmental factors (i.e., those that are independent of family upbringing) are more important than family environmental effects.

Although "nurture" has historically been referred to as the care given to children by the parents, with the mother playing a role of particular importance, this term is now regarded by some as any environmental (not genetic) factor in the contemporary nature versus nurture debate. Thus the definition of "nurture" has expanded to include influences on development arising from prenatal, parental, extended family, and peer experiences, and extending to influences such as media, marketing, and socio-economic status. Indeed, a substantial source of environmental input to human nature may arise from stochastic variations in prenatal development.

Heritability estimates

![Correlation of sibling traits](chart)

This chart illustrates three patterns one might see when studying the influence of genes and environment on traits in individuals. Trait A shows a high sibling correlation, but little heritability (i.e. high shared environmental variance c2; low heritability h2). Trait B shows a high heritability since correlation of trait rises sharply with degree of genetic similarity. Trait C shows low heritability, but also low correlations generally; this means Trait C has a high nonshared environmental variance e2. In other words, the degree to which individuals display Trait C has little to do with either genes or broadly predictable environmental factors—roughly, the outcome

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approaches random for an individual. Notice also that even identical twins raised in a common family rarely show 100% trait correlation.

It is important to note that the term heritability refers only to the degree of genetic variation between people on a trait. It does not refer to the degree to which a trait of a particular individual is due to environmental or genetic factors. The traits of an individual are always a complex interweaving of both. For an individual, even strongly genetically influenced, or "obligate" traits, such as eye color, assume the inputs of a typical environment during ontogenetic development (e.g., certain ranges of temperatures, oxygen levels, etc.).

In contrast, the "heritability index" statistically quantifies the extent to which variation between individuals on a trait is due to variation in the genes those individuals carry. In animals where breeding and environments can be controlled experimentally, heritability can be determined relatively easily. Such experiments would be unethical for human research. This problem can be overcome by finding existing populations of humans that reflect the experimental setting the researcher wishes to create.

One way to determine the contribution of genes and environment to a trait is to study twins. In one kind of study, identical twins reared apart are compared to randomly selected pairs of people. The twins share identical genes, but different family environments. In another kind of twin study, identical twins reared together (who share family environment and genes) are compared to fraternal twins reared together (who also share family environment but only share half their genes). Another condition that permits the disassociation of genes and environment is adoption. In one kind of adoption study, biological siblings reared together (who share the same family environment and half their genes) are compared to adoptive siblings (who share their family environment but none of their genes).

In many cases, it has been found that genes make a substantial contribution, including psychological traits such as intelligence and personality. Yet heritability may differ in other circumstances, for instance environmental deprivation. Examples of low, medium, and high heritability traits include:

<table>
<thead>
<tr>
<th>Low heritability</th>
<th>Medium heritability</th>
<th>High heritability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific language</td>
<td>Weight</td>
<td>Blood type</td>
</tr>
<tr>
<td>Specific religion</td>
<td>Religiosity</td>
<td>Eye color</td>
</tr>
</tbody>
</table>

Twin and adoption studies have their methodological limits. For example, both are limited to the range of environments and genes which they sample. Almost all of these studies are conducted in Western, first-world countries, and therefore cannot be extrapolated globally to include poorer, non-western populations. Additionally, both types of studies depend on particular assumptions, such as the equal

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environments assumption in the case of twin studies, and the lack of pre-adoptive effects in the case of adoption studies.

**Interaction of genes and environment**

Heritability refers to the origins of differences between people. Individual development, even of highly heritable traits, such as eye color, depends on a range of environmental factors, from the other genes in the organism, to physical variables such as temperature, oxygen levels etc. during its development or ontogenesis.

The variability of trait can be meaningfully spoken of as being due in certain proportions to genetic differences ("nature"), or environments ("nurture"). For highly penetrant Mendelian genetic disorders such as Huntington’s disease virtually all the incidence of the disease is due to genetic differences. Huntington’s animal models live much longer or shorter lives depending on how they are cared for.

At the other extreme, traits such as native language are environmentally determined: linguists have found that any child (if capable of learning a language at all) can learn any human language with equal facility. With virtually all biological and psychological traits, however, genes and environment work in concert, communicating back and forth to create the individual.

At a molecular level, genes interact with signals from other genes and from the environment. While there are many thousands of single-gene-locus traits, so-called complex traits are due to the additive effects of many (often hundreds) of small gene effects. A good example of this is height, where variance appears to be spread across many hundreds of loci.

Extreme genetic or environmental conditions can predominate in rare circumstances —if a child is born mute due to a genetic mutation, it will not learn to speak any language regardless of the environment; similarly, someone who is practically certain to eventually develop Huntington’s disease according to their genotype may die in an unrelated accident (an environmental event) long before the disease will manifest itself.
The "two buckets" view of heritability.

![Diagram showing two buckets for Genes and Environment]

More realistic "homogenous mudpie" view of heritability.

Steven Pinker (2004) likewise described several examples:

concrete behavioral traits that patently depend on content provided by the home or culture—which language one speaks, which religion one practices, which political party one supports—are not heritable at all. But traits that reflect the underlying talents and temperaments—how proficient with language a person is, how religious, how liberal or conservative—are partially heritable.

When traits are determined by a complex interaction of genotype and environment it is possible to measure the heritability of a trait within a population. However, many non-scientists who encounter a report of a trait having a certain percentage heritability imagine non-interactional, additive contributions of genes and environment to the trait. As an analogy, some laypeople may think of the degree of a trait being made up of two "buckets," genes and environment, each able to hold a certain capacity of the trait. But even for intermediate heritabilities, a trait is always shaped by both genetic dispositions and the environments in which people develop, merely with greater and lesser plasticities associated with these heritability measures.

Heritability measures always refer to the degree of variation between individuals in a population. These statistics cannot be applied at the level of the individual. It is incorrect to say that since the heritability index of personality is about 0.6, you got 60% of your personality from your parents and 40% from the environment. To help understand this, imagine that all humans were genetic clones. The heritability index for all traits would be zero (all variability between clonal individuals must be due to environmental factors). And, contrary to erroneous interpretations of the heritability index, as societies become more egalitarian (everyone has more similar experiences) the heritability index goes up (as environments become more similar, variability between individuals is due more to genetic factors).

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Some have pointed out that environmental inputs affect the expression of genes (see the article on epigenetics). This is one explanation of how environment can influence the extent to which a genetic disposition will actually manifest. The interactions of genes with environment, called gene–environment interactions, are another component of the nature–nurture debate. A classic example of gene–environment interaction is the ability of a diet low in the amino acid phenylalanine to partially suppress the genetic disease phenylketonuria. Yet another complication to the nature–nurture debate is the existence of gene-environment correlations. These correlations indicate that individuals with certain genotypes are more likely to find themselves in certain environments. Thus, it appears that genes can shape (the selection or creation of) environments. Even using experiments like those described above, it can be very difficult to determine convincingly the relative contribution of genes and environment.

**Obligate vs. Facultative Adaptations**

Traits may be considered likely to be adaptations (such as the umbilical cord), byproducts of adaptations (the belly button) or due to random variation (convex or concave belly button shape). Within the class of adaptations, an alternative to contrasting nature and nurture focusses on "obligate vs. facultative" adaptations. This distinction asks whether an adaptation is obligate (robust in the face of typical environmental variation) or facultative (sensitive to typical environmental variation). The rewarding sweet taste of sugar and the pain of bodily damage are obligate psychological adaptations -- typical environmental variability during development does not much affect their operation. On the other hand, facultative adaptations are somewhat like "if-then" statements. An example is suggested to be adult attachment style. If attachment is sensitive to early childhood experience, then as adults, the propensity to develop close, trusting bonds with others is conditional on whether early childhood caregivers could be trusted to provide reliable assistance and attention. Buss proposes also that the adaptation of skin to tan on exposure to sunlight is an example of a facultative adaptation.

**Advanced techniques**

The power of quantitative studies of heritable traits has been expanded by the development of new techniques. Developmental genetic analysis examines the effects of genes over the course of a human lifespan. For example, early studies of intelligence, which mostly examined young children, found that heritability measures 40–50%. Subsequent developmental genetic analyses found that variance attributable to additive environmental effects is less apparent in older individuals, with estimated heritability of IQ being higher than that in adulthood.
Another advanced technique, multivariate genetic analysis, examines the genetic contribution to several traits that vary together. For example, multivariate genetic analysis has demonstrated that the genetic determinants of all specific cognitive abilities (e.g., memory, spatial reasoning, processing speed) overlap greatly, such that the genes associated with any specific cognitive ability will affect all others. Similarly, multivariate genetic analysis has found that genes that affect scholastic achievement completely overlap with the genes that affect cognitive ability.

Extremes analysis, examines the link between normal and pathological traits. For example, it is hypothesized that a given behavioral disorder may represent an extreme of a continuous distribution of a normal behavior and hence an extreme of a continuous distribution of genetic and environmental variation. Depression, phobias, and reading disabilities have been examined in this context.

For a few highly heritable traits, some studies have identified loci associated with variance in that trait in some individuals. For example, research groups have identified loci that are associated with schizophrenia (Harrison and Owen, 2003) in subsets of patients with that diagnosis.

**IQ debate**

Evidence suggests that family environmental factors may have an effect upon childhood IQ, accounting for up to a quarter of the variance. On the other hand, by late adolescence this correlation disappears, such that adoptive siblings are no more similar in IQ than strangers.

Moreover, adoption studies indicate that, by adulthood, adoptive siblings are no more similar in IQ than strangers (IQ correlation near zero), while full siblings show an IQ correlation of 0.6. Twin studies reinforce this pattern: monozygotic (identical) twins raised separately are highly similar in IQ (0.74), more so than dizygotic (fraternal) twins raised together (0.6) and much more than adoptive siblings (~0.0).

**Personality traits**

Personality is a frequently cited example of a heritable trait that has been studied in twins and adoptions. Identical twins reared apart are far more similar in personality than randomly selected pairs of people. Likewise, identical twins are more similar than fraternal twins. Also, biological siblings are more similar in personality than adoptive siblings. Each observation suggests that personality is heritable to a certain extent. However, these same study designs allow for the examination of environment as well as genes. Adoption studies also directly measure the strength of shared family effects. Adopted siblings share only family environment. Most adoption studies indicate that by adulthood the personalities of adopted siblings are little or no more similar than random pairs of strangers. This would mean that

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shared family effects on personality are zero by adulthood. As is the case with personality, non-shared environmental effects are often found to out-weight shared environmental effects. That is, environmental effects that are typically thought to be life-shaping (such as family life) may have less of an impact than non-shared effects, which are harder to identify. One possible source of non-shared effects is the environment of pre-natal development. Random variations in the genetic program of development may be a substantial source of non-shared environment. These results suggest that "nurture" may not be the predominant factor in "environment."

**Genomics**

With the advent of genomic sequencing, it has become possible to search for and identify specific gene polymorphisms that affect traits such as IQ and personality. These techniques work by tracking the association of differences in a trait of interest with differences in specific molecular markers or functional variants. An example of a visible human traits for which the precise genetic basis of differences are relatively well known is eye color. For traits with many genes affecting the outcome, a smaller portion of the variance is currently understood: For instance for height known gene variants account for around 5-10% of height variance at present.

**Philosophical difficulties**

Philosophical questions regarding nature and nurture include the question of the nature of the trait itself, questions of determinism, and whether the question is well posed.

As well as asking if a trait such as IQ is heritable, one can ask what it is about "intelligence" that is being inherited. Similarly, if in a broad set of environments genes account for almost all observed variation in a trait then this raises the notion of genetic determinism and or biological determinism, and the level of analysis which is appropriate for the trait. Finally, as early as 1951, Calvin Hall suggested that discussion opposing nature and nurture was fruitless. Environments may be able to be varied in ways that affect development: This would alter the heritability of the character changes, too. Conversely, if the genetic composition of a population changes, then heritability may also change.

The example of phenylketonuria (PKU) is informative. Untreated, this is a completely penetrant genetic disorder causing brain damage and progressive mental retardation. PKU can be treated by the elimination of phenylalanine from the diet. Hence, a character (PKU) that used to have a virtually perfect heritability is not heritable any more if modern medicine is available (the actual allele causing PKU would still be inherited, but the phenotype PKU would not be expressed anymore). It is useful then to think of what is inherited as a mechanism for breaking down phenylalanine. Separately from this we can consider whether the organism has

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other mechanisms (for instance a drug that breakdown this amino acid) or does not need the mechanism (due to dietary exclusion).

Similarly, within, say, an inbred strain of mice, no genetic variation is present and every character will have a zero heritability. If the complications of gene-environment interactions and correlations (see above) are added, then it appears to many that heritability, the epitome of the nature-nurture opposition, is "a station passed."

A related concept is the view that the idea that either nature or nurture explains a creature's behavior is an example of the single cause fallacy.

**Gene-environment correlation**

Gene-environment correlation (or genotype-environment correlation) is said to occur when exposure to environmental conditions depends on an individual's genotype.

**Definition**

Gene-environment correlations can arise by both causal and non-causal mechanisms. Of principal interest are those causal mechanisms, which indicate genetic control over environmental exposure. Genetic variants influence environmental exposure indirectly via behavior. Three causal mechanisms giving rise to gene-environment correlations have been described.

(i) **Passive gene-environment correlation** refers to the association between the genotype a child inherits from her parents and the environment in which the child is raised. Parents create a home environment that is influenced by their own heritable characteristics. Biological parents also pass on genetic material to their children. When the children's genotype also influences their behavioral or cognitive outcomes, the result can be a spurious relationship between environment and outcome. For example, because parents who have histories of antisocial behavior (which is moderately heritable) are at elevated risk of abusing their children, a case can be made for saying that maltreatment may be a marker for genetic risk that parents transmit to children rather than a causal risk factor for children's conduct problems.

(ii) **Evocative (or reactive) gene-environment correlation** happens when an individual's (heritable) behavior evokes an environmental response. For example, the association between marital conflict and depression may reflect the tensions that arise when engaging with a depressed spouse rather than a causal effect of marital conflict on risk for depression.
(iii) **Active gene-environment correlation** occurs when an individual possesses a heritable propensity to select environmental exposure. For example, individuals who are characteristically extroverted may seek out very different social environments than those who are shy and withdrawn.

Gene-environment correlation can also arise from non-causal mechanisms, including evolutionary processes and behavioral contamination of the environmental measure. Evolutionary processes, such as genetic drift and natural selection, can cause allele frequencies to differ between populations. For example, exposure to malaria-bearing mosquitoes over many generations may have caused the higher allele frequency among certain ethnic groups for the sickle hemoglobin (HbS) allele, a recessive mutation that causes sickle-cell disease but confers resistance against malaria. In this way, HbS genotype has become associated with the malarial environment.

**Evidence**

**Quantitative genetic studies**

Twin and adoption studies have provided much of the evidence for gene-environment correlations by demonstrating that putative environmental measures are heritable. For example, studies of adult twins have shown that desirable and undesirable life events are moderately heritable as are specific life events and life circumstances, including divorce, the propensity to marry, marital quality and social support. Studies in which researchers have measured child-specific aspects of the environment have also shown that putative environmental factors, such as parental discipline or warmth, are moderately heritable. Television viewing, peer group orientations and social attitudes have all been shown to be moderately heritable. There is also a growing literature on the genetic factors influencing behaviors that constitute a risk to health, such as the consumption of alcohol, tobacco and illegal drugs, and risk-taking behaviors. Like parental discipline, these health related behaviors are genetically influenced, but are thought to have environmentally mediated effects on disease. To the extent that researchers have attempted to determine why genes and environments are correlated, most evidence has pointed to the intervening effects of personality and behavioral characteristics.

Environments are heritable because genotype influences the behaviours that evoke, select, and modify features of the environment. Thus, environments less amenable to behavioural modification tend to be less heritable. For example, negative life events that are beyond the control of the individual (e.g., the death of a loved one, losing one’s home in a natural disaster) have lower heritability than negative life events that may be dependent on an individual’s behaviour (e.g., getting a divorce, getting fired from a job). Similarly, personal life events (i.e., events that occur directly to an individual) are more highly heritable than network life events (i.e.,
events that occur to someone within an individual’s social network, thus affecting the individual indirectly).

**Molecular genetic studies**

Evidence for the existence of gene-environment correlations has recently started to accrue from molecular genetic investigations. The Collaborative Studies on Genetics of Alcoholism (COGA) group has reported that a single-nucleotide polymorphism in intron 7 of the gamma-aminobutyric acid Aa2 receptor (rs279871; GABRA2) was associated with alcohol dependence and marital status. Individuals who had the high-risk GABRA2 variant (i.e., the variant associated with alcohol dependence) were less likely to be married, in part because they were at higher risk for antisocial personality disorder and were less likely to be motivated by a desire to please others. There is also molecular evidence for passive gene-environment correlation. A recent study found that children were almost 2.5 times more likely to be diagnosed with attention-deficit hyperactivity disorder (ADHD) if their mothers were divorced, separated, or never married. In this sample, however, mothers possessing the short allele of the dopamine receptor gene DRD2 were more likely to be divorced, separated, or never married. Moreover, their children were more likely to have ADHD. Therefore, part of the association between parental marital status and ADHD diagnosis among children in this sample is due to the confounding variable of maternal DRD2 genotype. Both of these studies also found evidence for gene-environment interaction.

**Significance**

Doctors want to know whether exposure to environmental risk causes disease. The fact that environmental exposures are heritable means that the relationship between environmental exposure and disease may be confounded by genotype. That is, the relationship may be spurious (not causal) because the same genetic factors influence both exposure to environmental risk and disease. If so then reducing environmental exposure will not reduce the risk for disease.

For example, a study of children born to twin sisters investigated whether the relationship between parental divorce and offspring alcohol and emotional problems was causal or confounded by parental genotype. The study found that the offspring of twin sisters who were discordant for divorce had equally high levels of emotional problems, suggesting that genetic factors which made twin siblings divorce-prone also increased their children’s risk for depression and anxiety. This finding suggests that preventing the parents’ divorce would have had little impact on offspring risk for emotional problems (although the findings for alcohol problems were consistent with a causal role for divorce).
Lev Vygotsky

Lev Semyonovich Vygotsky (Russian: Лев Семёнович Выготский, born Lev Simyonoivich Vygodsky; November 17 [O.S. November 5] 1896 – June 11, 1934) was a Soviet psychologist, the founder of cultural-historical psychology, and the leader of the Vygotsky Circle.

Biography

Vygotsky was born in Orsha, in the Russian Empire (today in Belarus) into a nonreligious Jewish family. He was influenced by his cousin, David Vygotsky. He graduated from Moscow State University in 1917. In the mid-1920s, he worked at the Institute of Psychology and other educational, research, and clinical institutions in Moscow, Leningrad, and Kharkov where he extensively investigated ideas about cognitive development. He died in 1934, at the age of 37, in Moscow of tuberculosis.

Work

A pioneering psychologist, Vygotsky was also a highly prolific author: his major works span 6 volumes, written over roughly 10 years, from his Psychology of Art (1925) to Thought and Language [or Thinking and Speech] (1934). Vygotsky’s interests in the fields of developmental psychology, child development, and education were extremely diverse. The philosophical framework he provided includes not only insightful interpretations about the cognitive role of tools of mediation, but also the re-interpretation of well-known concepts in psychology such as the notion of internalization of knowledge. Vygotsky introduced the notion of zone of proximal development, an innovative metaphor capable of describing not the actual, but the potential of human cognitive development. His work covered such diverse topics as the origin and the psychology of art, development of higher mental functions, philosophy of science and methodology of psychological research, the relation between learning and human development, concept formation, interrelation between language and thought development, play as a psychological phenomenon, the study of learning disabilities, and abnormal human development (aka defectology).

Cultural mediation and internalization

Vygotsky investigated child development and how this was guided by the role of culture and interpersonal communication. Vygotsky observed how higher mental functions developed historically within particular cultural groups, as well as individually through social interactions with significant people in a child’s life, particularly parents, but also other adults. Through these interactions, a child came to learn the habits of mind of her/his culture, including speech patterns, written language, and other symbolic knowledge through which the child derives meaning.

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and which affected a child's construction of her/his knowledge. This key premise of Vygotskian psychology is often referred to as cultural mediation. The specific knowledge gained by children through these interactions also represented the shared knowledge of a culture. This process is known as internalization.

Internalization can be understood in one respect as “knowing how”. For example, riding a bicycle or pouring a cup of milk are tools of the society and initially outside and beyond the child. The mastery of these skills occurs through the activity of the child within society. A further aspect of internalization is appropriation, in which the child takes a tool and makes it his own, perhaps using it in a way unique to himself. Internalizing the use of a pencil allows the child to use it very much for his own ends rather than draw exactly what others in society have drawn previously.

Guided participation, which takes place when creative thinkers interact with a knowledgeable person, is practiced around the world. Cultures may differ, though, in the goals of development. For example, Mayan mothers in Guatemala help their daughters learn to weave through guided participation.

**Psychology of play**

Less known is Vygotsky's research on play, or children's games, as a psychological phenomenon and its role in the child’s development. Through play the child develops abstract meaning separate from the objects in the world, which is a critical feature in the development of higher mental functions.

The famous example Vygotsky gives is of a child who wants to ride a horse but cannot. If the child were under three, he would perhaps cry and be angry, but around the age of three the child's relationship with the world changes: "Henceforth play is such that the explanation for it must always be that it is the imaginary, illusory realization of unrealizable desires. Imagination is a new formation that is not present in the consciousness of the very raw young child, is totally absent in animals, and represents a specifically human form of conscious activity. Like all functions of consciousness, it originally arises from action." (Vygotsky, 1978)

The child wishes to ride a horse but cannot, so he picks up a stick and stands astride of it, thus pretending he is riding a horse. The stick is a pivot. "Action according to rules begins to be determined by ideas, not by objects.... It is terribly difficult for a child to sever thought (the meaning of a word) from object. Play is a transitional stage in this direction. At that critical moment when a stick – i.e., an object – becomes a pivot for severing the meaning of horse from a real horse, one of the basic psychological structures determining the child’s relationship to reality is radically altered."
As children get older, their reliance on pivots such as sticks, dolls and other toys diminishes. They have internalized these pivots as imagination and abstract concepts through which they can understand the world. "The old adage that 'children's play is imagination in action' can be reversed: we can say that imagination in adolescents and schoolchildren is play without action" (Vygotsky, 1978).

Another aspect of play that Vygotsky referred to was the development of social rules that develop, for example, when children play house and adopt the roles of different family members. Vygotsky cites an example of two sisters playing at being sisters. The rules of behavior between them that go unnoticed in daily life are consciously acquired through play. As well as social rules, the child acquires what we now refer to as self-regulation. For example, when a child stands at the starting line of a running race, she may well desire to run immediately so as to reach the finish line first, but her knowledge of the social rules surrounding the game and her desire to enjoy the game enable her to regulate her initial impulse and wait for the start signal.

**Thought and Language**

Perhaps Vygotsky's most important contribution concerns the inter-relationship of language development and thought. This concept, explored in Vygotsky's book Thought and Language, (alternative translation: Thinking and Speaking) establishes the explicit and profound connection between speech (both silent inner speech and oral language), and the development of mental concepts and cognitive awareness. It should be noted that Vygotsky described inner speech as being qualitatively different from normal (external) speech. Although Vygotsky believed inner speech developed from external speech via a gradual process of internalization, with younger children only really able to "think out loud," he claimed that in its mature form inner speech would be unintelligible to anyone except the thinker, and would not resemble spoken language as we know it (in particular, being greatly compressed). Hence, thought itself develops socially.

An infant learns the meaning of signs through interaction with its main care-givers, e.g., pointing, cries, and gurgles can express what is wanted. How verbal sounds can be used to conduct social interaction is learned through this activity, and the child begins to utilize, build, and develop this faculty, e.g., using names for objects, etc.

Language starts as a tool external to the child used for social interaction. The child guides personal behavior by using this tool in a kind of self-talk or "thinking out loud." Initially, self-talk is very much a tool of social interaction and it tapers to negligible levels when the child is alone or with deaf children. Gradually self-talk is used more as a tool for self-directed and self-regulating behavior. Then, because speaking has been appropriated and internalized, self-talk is no longer present.
around the time the child starts school. Self-talk "develops along a rising not a declining, curve; it goes through an evolution, not an involution. In the end, it becomes inner speech" (Vygotsky, 1987, pg 57). Inner speech develops through its differentiation from social speech.

Speaking has thus developed along two lines, the line of social communication and the line of inner speech, by which the child mediates and regulates their activity through their thoughts which in turn are mediated by the semiotics (the meaningful signs) of inner speech. This is not to say that thinking cannot take place without language, but rather that it is mediated by it and thus develops to a much higher level of sophistication. Just as the birthday cake as a sign provides much deeper meaning than its physical properties allow, inner speech as signs provides much deeper meaning than the lower psychological functions would otherwise allow.

Inner speech is not comparable in form to external speech. External speech is the process of turning thought into words. Inner speech is the opposite; it is the conversion of speech into inward thought. Inner speech for example contains predicates only. Subjects are superfluous. Words too are used much more economically. One word in inner speech may be so replete with sense to the individual that it would take many words to express it in external speech.

**Zone of proximal development**

"Zone of proximal development" (ZPD) is Vygotsky's term for the range of tasks that a child can complete independently and those completed with the guidance and assistance of adults or more-skilled children. The lower limit of ZPD is the level of skill reached by the child working independently. The upper limit is the level of additional responsibility the child can accept with the assistance of an able instructor. The ZPD captures the child's cognitive skills that are in the process of maturing and can be accomplished only with the assistance of a more-skilled person. Scaffolding is a concept closely related to the idea of ZPD. Scaffolding is changing the level of support. Over the course of a teaching session, a more-skilled person adjusts the amount of guidance to fit the child's current performance. Dialogue is an important tool of this process in the zone of proximal development. In a dialog; a child's unsystematic, disorganized, and spontaneous concepts are met with the more systematic, logical and rational concepts of the skilled helper.

**Influence in Eastern Europe**

In the Soviet Union, the work of the group of Vygotsky's students known as the Kharkov School of Psychology was vital for preserving the scientific legacy of Lev Vygotsky and identifying new avenues of its subsequent development. The members of the group laid a foundation for Vygotskian psychology's systematic development in such diverse fields as the psychology of memory (P. Zinchenko), perception,
sensation and movement (Zaporozhets, Asnin, A. N. Leont'ev), personality (L. Bozhovich, Asnin, A. N. Leont'ev), will and volition (Zaporozhets, A. N. Leont'ev, P. Zinchenko, L. Bozhovich, Asnin), psychology of play (G. D. Lukov, D. El'konin) and psychology of learning (P. Zinchenko, L. Bozhovich, D. El'konin), as well as the theory of step-by-step formation of mental actions (Gal'perin), general psychological activity theory (A. N. Leont'ev) and psychology of action (Zaporozhets). A. Puzyrey elaborated the ideas of Vygotsky in respect of psychotherapy and even in the broader context of deliberate psychological intervention (psychotechnique), in general.

Critics

In the Soviet Union, the school of Vygotsky and, specifically, his cultural-historical psychology was much criticized during his lifetime as well as after his death. By the beginning of the 1930s, the school was defeated in Soviet academic and political circles by Vygotsky's "scientific" opponents who criticized him for "idealistic aberrations", which at that time equaled with the charge in disloyalty to the Communist Party (and, particularly during the Stalin era, frequently entailed serious consequences not only for academic work but also in terms of potential prosecution, detention, and/or execution). As a result of this criticism of their work, a major group of Vygotsky's students including Luria and Leontiev had to flee from Moscow to Ukraine where they established the Kharkov school of psychology. Later, the representatives of the school would, in turn, in the second half of the 1930s criticize Vygotsky himself for his interest in the cross-disciplinary study of the child that was developed under the umbrella term of paedology (also spelled as pedology) as well as for his ignoring the role of practice and practical, object-bound activity and arguably his emphasis on the research on the role of language and, on the other hand, emotional factors in human development. Much of this early criticism of the 1930s was later discarded by these Vygotskian scholars themselves. Another line of the critique of Vygotsky's psychological theory comes from such major figures of the Soviet psychology as Sergei Rubinstein and his followers who criticized Vygotsky's notion of mediation and its development in the works of students.

Some critics say Vygotsky overemphasized the role of language in thinking. Also, his emphasis on collaboration and guidance has potential pitfalls if facilitators are too helpful in some cases. An example of that would be an overbearing and controlling parent. Other critics argue that some children may become lazy and expect help when they can do something on their own.

Zone of proximal development

The zone of proximal development (зона ближайшего развития), often abbreviated ZPD, is the difference between what a learner can do without help and
what he or she can do with help. It is a concept developed by Soviet psychologist and social constructivist Lev Vygotsky (1896 – 1934).

Vygotsky stated that a child follows an adult’s example and gradually develops the ability to do certain tasks without help. Vygotsky’s often-quoted definition of zone of proximal development presents it as

the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance, or in collaboration with more capable peers.

Vygotsky and other educational professionals believed education’s role was to give children experience that were within their zones of proximal development, thereby encouraging and advancing their individual learning.

Origins

The concept of the zone of proximal development was originally developed by Vygotsky to argue against the use of academic, knowledge-based tests as a means to gauge students’ intelligence. Vygotsky argued that, rather than examining what a student knows to determine intelligence, it is better to examine his or her ability to solve problems independently and his or her ability to solve problems with an adult’s help.

Development

The concept of ZPD has been expanded, modified, and changed into new concepts since Vygotsky’s original conception.

The concept of scaffolding is closely related to the ZPD, although Vygotsky himself never mentioned the term; instead, scaffolding was developed by other sociocultural theorists applying Vygotsky’s ZPD to educational contexts. Scaffolding is a process through which a teacher or more competent peer helps the student in his or her ZPD as necessary, and tapers off this aid as it becomes unnecessary, much as a scaffold is removed from a building during construction. "Scaffolding [is] the way the adult guides the child’s learning via focused questions and positive interactions." This concept has been further developed by Ann Brown, among others. Several instructional programs were developed on this interpretation of the ZPD, including reciprocal teaching and dynamic assessment.

While the ideas of Vygotsky’s ZPD originally were used strictly for one’s ability to solve problems, Tharp and Gallimore point out that it can be expanded to examining other domains of competence and skills. These specialized zones of development

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include cultural zones, individual zones, and skill-oriented zones. Early-childhood-development researchers commonly believe that young children learn their native language and motor skills generally by being placed in the zone of proximal development.

Through their work with collaborative groups of adults, Tinsley and Lebak (2009) identified the "Zone of Reflective Capacity". This zone shares the theoretical attributes of the ZPD, but is a more specifically defined construct helpful in describing and understanding the way in which an adult's capacity for reflection can expand when he or she collaborates over an extended period with other adults who have similar goals. Tinsley and Lebak found that, as adults shared their feedback, analysis, and evaluation of one another's work during collaboration, their potential for critical reflection expanded. The zone of reflective capacity expanded as trust and mutual understanding among the peers grew.

The zone of reflective capacity is constructed through the interaction between participants engaged in a common activity and expands when it is mediated by positive interactions with other participants, exactly along the same lines as the ZPD, as Wells (1999) described.

**Cultural mediation**

Cultural mediation is one of the fundamental mechanisms of distinctly human development according to cultural–historical psychological theory introduced by Lev Vygotsky and developed in the work of his numerous followers worldwide.

**Introduction**

Vygotsky investigated child development and how this was guided by the role of culture and interpersonal communication. Vygotsky observed how higher mental functions developed through social interactions with significant people in a child's life, particularly parents, but also other adults. Through these interactions, a child came to learn the habits of mind of her/his culture, including speech patterns, written language, and other symbolic knowledge through which the child derives meaning and affects a child's construction of his or her knowledge. This key premise of Vygotskian psychology is often referred to as "cultural mediation". The specific knowledge gained by a child through these interactions also represented the shared knowledge of a culture. This process is known as internalization.

**Example**

The easiest way to understand mediation is to start with an example and follow with the Vygotskian principles behind it.
At a North American girl’s fourth birthday, she sits at the table with friends and family. As the candles on her birthday cake are lit and it is placed on the table, the child gains a feeling of deeply felt joy. This is not only because she knows the cake is sweet and she likes sweet food, nor that the candles’ sparkling is pleasing to her eyes. While these would be sufficient reason to arouse an emotional response in an ape, there are mental processes in a four-year-old that extend well beyond this. She patiently waits as her family and friends sing “Happy Birthday to You”. The joy is not in the cake itself but in the cake’s specific meaning to her. It is a sign that today is a special day for her in which she is the center of attention and that her friends and family are praising her. It’s also a sign that she is bigger and as such has higher status among her peers. It’s not just a cake, it is a birthday cake and, more specifically, it is her own. The true significance of the birthday cake then, is not in its physical properties at all, but rather in the significance bestowed upon it by the culture the daughter is growing into. This is not restricted to such artifacts as a birthday cake. A classroom, a game of soccer, a fire engine are all first and foremost cultural artifacts from which children derive meaning.

This example can help us understand Vygotsky’s approach to human development. Like animals, we have lower mental functions tied closely to biological processes. In our birthday cake example, a toddler may well have reached out to take a handful of cream from the cake as soon as she saw it and the four-year-old may have been tempted to do the same. In humans, however, lower mental functions facilitate a new line of development qualitatively unique to humans. Vygotsky referred to this as the higher mental functions. The lower mental functions cannot be equated to those of an ape as they are interwoven with the line of higher mental functions and are essential to them.

"The history of child behavior is born from the interweaving of these two lines. The history of the development of the higher mental functions is impossible without a study of their prehistory, their biological roots, and their organic disposition." (Vygotsky, 1978, p. 46)

However, it is this higher line of development that explains the birthday cake example with profound insight.

From the perspective of an individual child’s development, the higher psychological line of development is one guided by the development of tools and signs within the culture. In our example above, the birthday cake is much more than a source of nourishment, it is a sign with much deeper and broader meaning. The sign mediates between the immediate sensory input and the child’s response, and in so doing allows for a moment of reflection and self-regulation that would not otherwise be possible. To the extent that these signs can be used to influence or change our physical or social environment they are tools. Even the birthday cake can be

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considered as a tool in that the parents use it to establish that their daughter is now older and has a new status in society.

The cake is a sophisticated example. Tools and signs can be much simpler, such as an infant pointing to an object she desires. At first she may simply be trying to reach the object, but the mother’s response of passing the object helps the infant realize that the action of pointing is a tool to change the environment according to her needs. It is from these simple inter-subjective beginnings that the world of meaning in the child mediated by tools and signs, including language, develops.

A fundamental premise of Vygotsky’s therefore, is that tools and signs are first and foremost shared between individuals in society and only then can they be internalized by individuals developing in the society as is reflected in this famous quote:

"Every function in the child’s cultural development appears twice: first, on the social level, and later on the individual level; first, between people (interpsychological), and then inside the child (intrapsychological). This applies equally to voluntary attention, to logical memory, and to the formation of concepts. All the higher functions originate as actual relations between human individuals." (Vygotsky, 1978, p. 57)

**Cultural-historical psychology**

Cultural-historical psychology (also called the school of Vygotsky, sociocultural psychology, socio-historical psychology, activity theory, cultural psychology, cultural historical activity theory, and social development theory) is a theory of psychology founded by Lev Vygotsky at the end of the 1920s and developed by his students and followers in Eastern Europe and worldwide.

Cultural-historical psychology emerged as a response to Cartesian dualism between mind and body in psychology of that time as a deliberate attempt to establish a new paradigm in psychological research that would overcome the narrow objectivism of behaviourism (Watson) and subjectivism of introspective psychology of Wundt, James, and others. It focuses on human development to make genetic claims about the function of mind in activity. These claims could be part of, or a basis for, a return to the unity of human sciences.

Vygotsky and his associates postulate in principle non-adaptive character and the mechanisms of higher psychical (mental) functions development. Defining the main goal of psychological inquiry as an objective study of human consciousness, the members of Vygotsky’s school investigate the role of cultural mediation and such cultural mediators as word, sign (Vygotsky), symbol, myth (Losev, V. Zinchenko) in

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the development of human higher psychical functions, development of personality and its "top-most' phenomenology.

A basic distinguishing feature of cultural-historical psychology is that "the species-specific characteristic of human beings is their need and ability to inhabit an environment transformed by the activity of prior members of their species. Such transformations and the mechanism of the transfer of these transformations from one generation to the next are the result of the ability/proclivity of human beings to create and use artifacts - aspects of the material world that are taken up into human action as modes of coordinating with the physical and social environment." (Cole 1995, p. 190) In this way, research has been done into the effects of literacy (Cole & Scribner) and mathematics (Saxe) outside of traditional schooling to understand how cognition develops embedded in a given place and time.

**Social constructivism**

Social constructivism is a sociological theory of knowledge that applies the general philosophical constructionism into social settings, wherein groups construct knowledge for one another, collaboratively creating a small culture of shared artifacts with shared meanings. When one is immersed within a culture of this sort, one is learning all the time about how to be a part of that culture on many levels. Its origins are largely attributed to Lev Vygotsky.

**Social constructivism and social constructionism**

Social constructivism is closely related to social constructionism in the sense that people are working together to construct artefacts. However, there is an important difference: social constructionism focuses on the artefacts that are created through the social interactions of a group, while social constructivism focuses on an individual's learning that takes place because of their interactions in a group.

A very simple example is an object like a cup. The object can be used for many things, but its shape does suggest some 'knowledge' about carrying liquids (see also Affordance). A more complex example is an online course - not only do the 'shapes' of the software tools indicate certain things about the way online courses should work, but the activities and texts produced within the group as a whole will help shape how each person behaves within that group.

For a philosophical account of one possible social constructionist ontology, see the 'Criticism' section of Representative realism.

**Social constructivism and education**

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Social constructivism has been studied by many educational psychologists, who are concerned with its implications for teaching and learning. Constructivism forms one of the major theories (behaviourism, social learning, constructivism and social constructivism) of child development, arising from the work of Jean Piaget’s theory of cognitive development. Piaget’s stage theory (describing four successive stages of development) also became known as constructivism, because he believed children needed to construct an understanding of the world for themselves. Social constructivism extends constructivism by incorporating the role of other actors and culture in development. In this sense it can also be contrasted with social learning theory by stressing interaction over observation.

Vygotsky’s contributions reside in Mind in Society (1930, 1978) and Thought and Language (1934, 1986). Vygotsky independently came to the same conclusions as Piaget regarding the constructive nature of development.

For more on the psychological dimensions of social constructivism, see the work of A. Sullivan Palincsar.

An instructional strategy grounded in social constructivism that is an area of active research is computer-supported collaborative learning (CSCL). This strategy gives students opportunities to practice 21st-century skills in communication, knowledge sharing, critical thinking and use of relevant technologies found in the workplace.

Additionally, studies on increasing the use of student discussion in the classroom both support and are grounded in theories of social constructivism. There are a full range of advantages that result from the implementation of discussion in the classroom. Participation in group discussion allows students to generalize and transfer their knowledge of classroom learning and builds a strong foundation for communicating ideas orally (Reznitskaya, Anderson & Kuo, 2007). Many studies argue that discussion plays a vital role in increasing student ability to test their ideas, synthesize the ideas of others, and build deeper understanding of what they are learning (Corden, 2001; Nystrand, 1996; Reznitskaya, Anderson & Kuo, 2007; Weber, Maher, Powell & Lee, 2008). Large and small group discussion also affords students opportunities to exercise self-regulation, self-determination, and a desire to persevere with tasks (Corden, 2001; Matsumara, Slater & Crosson, 2008). Additionally, discussion increases student motivation, collaborative skills, and the ability to problem solve (Dyson, 2004; Matsumara, Slater & Crosson, 2008; Nystrand, 1996). Increasing students’ opportunity to talk with one another and discuss their ideas increases their ability to support their thinking, develop reasoning skills, and to argue their opinions persuasively and respectfully (Reznitskaya, Anderson & Kuo, 2007). Furthermore, the feeling of community and collaboration in classrooms increases through offering more chances for students to talk together (Barab, Dodge, Thomas, Jackson, & Tuzun, 2007; Hale & Gty, 2002; Weber, Maher, Powell & Lee, 2008).

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Given the advantages that result from discussion, it is surprising that it is not used more often. Studies have found that students are not regularly accustomed to participating in academic discourse (Corden, 2001; Nystrand, 1996). Nystrand (1996) argues that teachers rarely choose classroom discussion as an instructional format. The results of Nystrand’s (1996) three year study focusing on 2400 students in 60 different classrooms indicate that the typical classroom teacher spends under three minutes an hour allowing students to talk about ideas with one another and the teacher (Nystrand, 1996). Even within those three minutes of discussion, most talk is not true discussion because it depends upon teacher directed questions with predetermined answers (Corden, 2001; Nystrand, 1996). Multiple observations indicate that students in low socioeconomic schools and lower track classrooms are allowed even fewer opportunities for discussion (Corden, 2001; Nystrand, 1996; Weber, Maher, Powell & Lee, 2008). Teachers who teach as if they value what their students think create learners. Discussion and interactive discourse promote learning because they afford students the opportunity to use language as a demonstration of their independent thoughts. Discussion elicits sustained responses from students that encourage meaning making through negotiating with the ideas of others. This type of learning “promotes retention and in-depth processing associated with the cognitive manipulation of information” (Nystrand, pg. 28).

**The Theory of Structural Cognitive Modifiability and Mediated Learning Experience**

Structural Cognitive Modifiability (SCM) as a theory grew out of Feuerstein’s interest to see people whose functioning was low and in certain cases extremely low, in turn became able to modify themselves through cognitive processes, so that they could adapt themselves to the requirements of society. Working with these people has made him aware that modifiability is indeed possible; it was then that he tried to look for the theoretical basis for strong empirical data. The theory of SCM has developed over the years, and has permitted him to create a large variety of cognitive programs which serve as the pillars of the theory.

The theory of Structural Cognitive Modifiability is described as “the unique propensity of human beings to change or modify the structure of their cognitive functioning to adapt to the changing demands of a life situation.”. This capacity for change is related to two types of human-environment interactions that are responsible for the development of differential cognitive functioning and higher mental processes: direct exposure to learning and mediated learning experience.

Over the years Feuerstein found that human development is not just biological, but from his stand point, also socio-cultural. The theory of SCM originated on two concepts – structure and modifiability. Feuerstein considers these two concepts to

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be the primary reason for behavioral manifestations of the mental and cognitive structures. The basis for the theory of SCM is derived from three different subparts.

1. The Human being is the outcome of a triple ontogeny – biological, social- cultural and the interactions of the mediated learning experience (MLE)

2. Model behavior represents states rather than traits of the organism, and leads to a new and more adaptive definition of intelligence

3. Brain plasticity results in the generation of new structures, created through internal and external behaviors

The theory SCM is based on a concept of human growth, which is characteristic of its evolutionary nature and of the transformation of its cognitive potentialities into the reasoning abilities and continuous search for solutions to the problems of diverse order raised by its surroundings

At the heart of SCM lies the theory of Mediated Learning Experience (MLE), to which Feuerstein attributes human modifiability. It is MLE which is a typical human modality of interaction that is responsible to the unique character of the human being which is structurally modifiable. Feuerstein offers a variety of conceptual tools including the cognitive map, the deficient cognitive functions and the process orientation which marks and shapes the applied aspects of the SCM theory

In the MLE modality, there are two formal models. One is the Behavioral Model of Stimulus-Response (S-R). The other is from the Cognitive Model (Piaget) Stimulus-Organism-Response (S-O-R). "MLE has a universal meaning irrespective of language or content in which the mediation interaction takes place."

Feuerstein defines Mediated Learning Experience as a quality of human-environment interactions. "It is much more than a simple pedagogical model and entails the shaping of cognitive process as a by product of cultural transmissions" As such it represents to stimuli, is considered as the "most pervasive" way in which the organism-environment interaction affects the organism. MLE, through which the interaction, human-environment, is mediated by a human being, whose intentionality "transforms the three components of S-O-R of what Piaget formed, into a meaningful way into a compatible combination. Feuerstein places great emphases on the H is the human, O is Organism, R is Response and S represents the Stimuli. Where H interposes himself between the S and the O as well as between the O and the R, there is mediation. This is what is known as S-H-O-H-R theory

Feuerstein notes that MLE represents the unique feature of human interaction and as such it is conceived of as the determinant of the auto plasticity of the human. MLE plays a major role in determining the evolutionary trends and the considerable
changes that take place in a humans’ mental (cognitive) functioning. A lack of MLE deprives the organism of its auto plasticity which may result in a lack of or reduced modifiability “(example: in individuals for whom the direct exposure is of an active operational nature).”

The theory of Mediated Learning Experience addresses the question, What are the origins of differential cognitive development? This question involves examining the organism (the learner) and the environment (the context in which the learning experience occurs) and the two factors involved are either organic or environmental. Organic factors consist of heredity, maturation level, and others. Environmental factors are sensory stimulation, socio-economic status, and educational opportunities. This theory suggests that these two types of factors constitute only “distal” determinants of cognitive development (factors which cause the differential responses to the environment), while the Mediated Learning Experience (or lack of) constitutes “proximal” determinants.

For MLE to occur, another human being (caregiver, parent, teacher, peer, etc.) interposes him or herself between the stimuli (or the learner’s response) and the learner with the intention of mediating the stimuli or response to the learner. This intervention is termed mediation. The mediator (for a child, initially the mother or another nurturing parent figure) modifies a set of stimuli by effecting qualities of intensity, context, frequency, and order, and at the same time arouses the child’s vigilance, awareness, and sensitivity. Inadequate MLE leads to cognitive functions that are undeveloped, poorly developed, arrested, impaired, or seldom and inefficiently used.

Clinical experience with the LPAD and FIE has enabled the development of an inventory of deficient cognitive functions, which are categorized across the Input, Elaboration, and Output Phases of the mental act. Deficiencies of the mental act can impair one phase or all phases, but not all of the time.

The Cognitive Map

Another important conceptual tool of the dynamic assessment process is the need to understand the relationship between the characteristics of the task and the performance of the subject. The “cognitive map” describes the mental act in terms of several parameters that permit an analysis and interpretation of a subject’s performance by locating specific problem areas and producing changes in corresponding dimensions. The manipulation of these parameters becomes highly important in the subject-examiner interaction, by helping the examiner to form and validate hypotheses regarding the subject’s performance difficulties. There are seven parameters to the cognitive map:

- Content of the mental act
- Modality or language in which the mental act is expressed
- Cognitive operations required for the mental act
- Level of complexity
- Level of abstraction
- Level of efficiency with which the mental act is performed

The cognitive map is an important element in the process of dynamic assessment and the use of the LPAD. It is reflected in the construction of the LPAD instruments and in the examiner’s choice regarding the order of the instruments to use with the subject, the amount of time and the extent of focus within the instrument, and the nature and type of mediation to offer within the functioning of the instrument.

**Lawrence Kohlberg's stages of moral development**

Lawrence Kohlberg’s stages of moral development constitute an adaptation of a psychological theory originally conceived of by the Swiss psychologist Jean Piaget. Kohlberg began work on this topic while a psychology postgraduate student at the University of Chicago, and expanded and developed this theory throughout his life.

The theory holds that moral reasoning, the basis for ethical behavior, has six identifiable developmental stages, each more adequate at responding to moral dilemmas than its predecessor. Kohlberg followed the development of moral judgment far beyond the ages studied earlier by Piaget, who also claimed that logic and morality develop through constructive stages. Expanding on Piaget’s work, Kohlberg determined that the process of moral development was principally concerned with justice, and that it continued throughout the individual’s lifetime, a notion that spawned dialogue on the philosophical implications of such research.

Kohlberg relied for his studies on stories such as the Heinz dilemma, and was interested in how individuals would justify their actions if placed in similar moral dilemmas. He then analyzed the form of moral reasoning displayed, rather than its conclusion, and classified it as belonging to one of six distinct stages.

There have been critiques of the theory from several perspectives. Arguments include that it emphasizes justice to the exclusion of other moral values, such as caring; that there is such an overlap between stages that they should more properly be regarded as separate domains; or that evaluations of the reasons for moral choices are mostly post hoc rationalizations (by both decision makers and psychologists studying them) of essentially intuitive decisions.

Nevertheless, an entirely new field within psychology was created as a direct result of Kohlberg’s theory, and according to Haggblom et al.’s study of the most eminent psychologists of the 20th century, Kohlberg was the 16th most frequently cited
psychologist in introductory psychology textbooks throughout the century, as well as the 30th most eminent overall.

Kohlberg's scale is about how people justify behaviors and his stages are not a method of ranking how moral someone's behavior is. There should however be a correlation between how someone scores on the scale and how they behave, and the general hypothesis is that moral behaviour is more responsible, consistent and predictable from people at higher levels.

Stages

Kohlberg's six stages can be more generally grouped into three levels of two stages each: pre-conventional, conventional and post-conventional. Following Piaget's constructivist requirements for a stage model, as described in his theory of cognitive development, it is extremely rare to regress in stages—to lose the use of higher stage abilities. Stages cannot be skipped; each provides a new and necessary perspective, more comprehensive and differentiated than its predecessors but integrated with them.

Level 1 (Pre-Conventional)

1. Obedience and punishment orientation
   (How can I avoid punishment?)

2. Self-interest orientation
   (What's in it for me?)
   (Paying for a benefit)

Level 2 (Conventional)

3. Interpersonal accord and conformity
   (Social norms)
   (The good boy/good girl attitude)

4. Authority and social-order maintaining orientation
   (Law and order morality)

Level 3 (Post-Conventional)

5. Social contract orientation

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6. Universal ethical principles

(Principled conscience)

Pre-conventional

The pre-conventional level of moral reasoning is especially common in children, although adults can also exhibit this level of reasoning. Reasoners at this level judge the morality of an action by its direct consequences. The pre-conventional level consists of the first and second stages of moral development, and is solely concerned with the self in an egocentric manner. A child with preconventional morality has not yet adopted or internalized society's conventions regarding what is right or wrong, but instead focuses largely on external consequences that certain actions may bring.

In Stage one (obedience and punishment driven), individuals focus on the direct consequences of their actions on themselves. For example, an action is perceived as morally wrong because the perpetrator is punished. "The last time I did that I got spanked so I will not do it again." The worse the punishment for the act is, the more "bad" the act is perceived to be. This can give rise to an inference that even innocent victims are guilty in proportion to their suffering. It is "egocentric", lacking recognition that others' points of view are different from one's own. There is "deference to superior power or prestige".

Stage two (self-interest driven) espouses the "what's in it for me" position, in which right behavior is defined by whatever is in the individual's best interest. Stage two reasoning shows a limited interest in the needs of others, but only to a point where it might further the individual's own interests. As a result, concern for others is not based on loyalty or intrinsic respect, but rather a "you scratch my back, and I'll scratch yours" mentality. The lack of a societal perspective in the pre-conventional level is quite different from the social contract (stage five), as all actions have the purpose of serving the individual's own needs or interests. For the stage two theorist, the world's perspective is often seen as morally relative.

Conventional

The conventional level of moral reasoning is typical of adolescents and adults. Those who reason in a conventional way judge the morality of actions by comparing them to society's views and expectations. The conventional level consists of the third and fourth stages of moral development. Conventional morality is characterized by an acceptance of society's conventions concerning right and wrong. At this level an individual obeys rules and follows society's norms even when there are no consequences for obedience or disobedience. Adherence to rules and conventions is

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somewhat rigid, however, and a rule's appropriateness or fairness is seldom questioned.

In Stage three (interpersonal accord and conformity driven), the self enters society by filling social roles. Individuals are receptive to approval or disapproval from others as it reflects society's accordance with the perceived role. They try to be a "good boy" or "good girl" to live up to these expectations, having learned that there is inherent value in doing so. Stage three reasoning may judge the morality of an action by evaluating its consequences in terms of a person’s relationships, which now begin to include things like respect, gratitude and the "golden rule". "I want to be liked and thought well of; apparently, not being naughty makes people like me." Desire to maintain rules and authority exists only to further support these social roles. The intentions of actions play a more significant role in reasoning at this stage; "they mean well ...".

In Stage four (authority and social order obedience driven), it is important to obey laws, dictums and social conventions because of their importance in maintaining a functioning society. Moral reasoning in stage four is thus beyond the need for individual approval exhibited in stage three; society must learn to transcend individual needs. A central ideal or ideals often prescribe what is right and wrong, such as in the case of fundamentalism. If one person violates a law, perhaps everyone would—thus there is an obligation and a duty to uphold laws and rules. When someone does violate a law, it is morally wrong; culpability is thus a significant factor in this stage as it separates the bad domains from the good ones. Most active members of society remain at stage four, where morality is still predominantly dictated by an outside force.

**Post-Conventional**

The post-conventional level, also known as the principled level, consists of stages five and six of moral development. There is a growing realization that individuals are separate entities from society, and that the individual’s own perspective may take precedence over society’s view; they may disobey rules inconsistent with their own principles. These people live by their own abstract principles about right and wrong—principles that typically include such basic human rights as life, liberty, and justice. Because of this level’s "nature of self before others", the behavior of post-conventional individuals, especially those at stage six, can be confused with that of those at the pre-conventional level.

People who exhibit postconventional morality view rules as useful but changeable mechanisms—ideally rules can maintain the general social order and protect human rights. Rules are not absolute dictates that must be obeyed without question. Contemporary theorists often speculate that many people may never reach this level of abstract moral reasoning.

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In Stage five (social contract driven), the world is viewed as holding different opinions, rights and values. Such perspectives should be mutually respected as unique to each person or community. Laws are regarded as social contracts rather than rigid edicts. Those that do not promote the general welfare should be changed when necessary to meet “the greatest good for the greatest number of people”. This is achieved through majority decision, and inevitable compromise. Democratic government is ostensibly based on stage five reasoning.

In Stage six (universal ethical principles driven), moral reasoning is based on abstract reasoning using universal ethical principles. Laws are valid only insofar as they are grounded in justice, and a commitment to justice carries with it an obligation to disobey unjust laws. Rights are unnecessary, as social contracts are not essential for deontic moral action. Decisions are not reached hypothetically in a conditional way but rather categorically in an absolute way, as in the philosophy of Immanuel Kant. This involves an individual imagining what they would do in another’s shoes, if they believed what that other person imagines to be true. The resulting consensus is the action taken. In this way action is never a means but always an end in itself; the individual acts because it is right, and not because it is instrumental, expected, legal, or previously agreed upon. Although Kohlberg insisted that stage six exists, he found it difficult to identify individuals who consistently operated at that level.

**Further stages**

In Kohlberg’s empirical studies of individuals throughout their life Kohlberg observed that some had apparently undergone moral stage regression. This could be resolved either by allowing for moral regression or by extending the theory. Kohlberg chose the latter, postulating the existence of sub-stages in which the emerging stage has not yet been fully integrated into the personality. In particular Kohlberg noted a stage 4½ or 4+, a transition from stage four to stage five, that shared characteristics of both. In this stage the individual is disaffected with the arbitrary nature of law and order reasoning; culpability is frequently turned from being defined by society to viewing society itself as culpable. This stage is often mistaken for the moral relativism of stage two, as the individual views those interests of society that conflict with their own as being relatively and morally wrong. Kohlberg noted that this was often observed in students entering college.

Kohlberg suggested that there may be a seventh stage—Transcendental Morality, or Morality of Cosmic Orientation—which linked religion with moral reasoning. Kohlberg’s difficulties in obtaining empirical evidence for even a sixth stage, however, led him to emphasize the speculative nature of his seventh stage.

**Theoretical assumptions (philosophy)**

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The picture of human nature Kohlberg begins with is that humans are inherently communicative and capable of reason. They also possess a desire to understand others and the world around them. The stages of Kohlberg's model relate to the qualitative moral reasonings adopted by individuals, and so do not translate directly into praise or blame of any individual's actions or character. Arguing that his theory measures moral reasoning and not particular moral conclusions, Kohlberg insists that the form and structure of moral arguments is independent of the content of those arguments, a position he calls "formalism".

Kohlberg's theory centers on the notion that justice is the essential characteristic of moral reasoning. Justice itself relies heavily upon the notion of sound reasoning based on principles. Despite being a justice-centered theory of morality, Kohlberg considered it to be compatible with plausible formulations of deontology and eudaimonia.

Kohlberg's theory understands values as a critical component of the right. Whatever the right is, for Kohlberg, it must be universally valid across societies (a position known as "moral universalism"): there can be no relativism. Moreover, morals are not natural features of the world; they are prescriptive. Nevertheless, moral judgments can be evaluated in logical terms of truth and falsity.

According to Kohlberg, someone progressing to a higher stage of moral reasoning cannot skip stages. For example, an individual cannot jump from being concerned mostly with peer judgments (stage three) to being a proponent of social contracts (stage five). On encountering a moral dilemma and finding their current level of moral reasoning unsatisfactory, however, an individual will look to the next level. Realizing the limitations of the current stage of thinking is the driving force behind moral development, as each progressive stage is more adequate than the last. The process is therefore considered to be constructive, as it is initiated by the conscious construction of the individual, and is not in any meaningful sense a component of the individual's innate dispositions, or a result of past inductions.

**Formal elements**

Progress through Kohlberg's stages happens as a result of the individual's increasing competence, both psychologically and in balancing conflicting social-value claims. The process of resolving conflicting claims to reach an equilibrium is called "justice operation." Kohlberg identifies two of these justice operations: "equality," which involves an impartial regard for persons, and "reciprocity," which means a regard for the role of personal merit. For Kohlberg, the most adequate result of both operations is "reversibility," in which a moral or dutiful act within a particular situation is evaluated in terms of whether or not the act would be
satisfactory even if particular persons were to switch roles within that situation (also known colloquially as "moral musical chairs").

<table>
<thead>
<tr>
<th>View of Persons</th>
<th>Social Perspective Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 Sees how human fallibility and frailty are impacted by communication</td>
<td>Mutual respect as a universal principle</td>
</tr>
<tr>
<td>5 Recognize that contracts will allow persons to increase welfare of both</td>
<td>Contractual perspective</td>
</tr>
<tr>
<td>4 Able to see abstract normative systems</td>
<td>Social systems perspective</td>
</tr>
<tr>
<td>3 Recognize good and bad intentions</td>
<td>Social relationships perspective</td>
</tr>
<tr>
<td>2 Sees that a) others have goals and preferences, b) either conform to or deviate from norms</td>
<td>Instrumental egoism</td>
</tr>
<tr>
<td>1 No VOP: only self &amp; norm are recognized</td>
<td>Blind egoism</td>
</tr>
</tbody>
</table>

Knowledge and learning contribute to moral development. Specifically important are the individual's "view of persons" and their "social perspective level", each of which becomes more complex and mature with each advancing stage. The "view of persons" can be understood as the individual's grasp of the psychology of other persons; it may be pictured as a spectrum, with stage one having no view of other persons at all, and stage six being entirely sociocentric. Similarly, the social perspective level involves the understanding of the social universe, differing from the view of persons in that it involves an appreciation of social norms.

**Examples of applied moral dilemmas**

Kohlberg established the Moral Judgement Interview in his original 1958 dissertation. During the roughly 45-minute tape recorded semi-structured interview, the interviewer uses moral dilemmas to determine which stage of moral reasoning a person uses. The dilemmas are fictional short stories that describe situations in which a person has to make a moral decision. The participant is asked a systemic series of open-ended questions, like what they think the right course of action is, as well as justifications as to why certain actions are right or wrong. The form and structure of these replies are scored and not the content; over a set of multiple moral dilemmas an overall score is derived.

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Heinz dilemma

A dilemma that Kohlberg used in his original research was the druggist's dilemma: Heinz Steals the Drug In Europe.

A woman was near death from a special kind of cancer. There was one drug that the doctors thought might save her. It was a form of radium that a druggist in the same town had recently discovered. The drug was expensive to make, but the druggist was charging ten times what the drug cost him to produce. He paid $200 for the radium and charged $2,000 for a small dose of the drug. The sick woman’s husband, Heinz, went to everyone he knew to borrow the money, but he could only get together about $1,000, which is half of what it cost. He told the druggist that his wife was dying and asked him to sell it cheaper or let him pay later. But the druggist said, "No, I discovered the drug and I'm going to make money from it." So Heinz got desperate and broke into the man's store to steal the drug for his wife. Should Heinz have broken into the laboratory to steal the drug for his wife? Why or why not?

From a theoretical point of view, it is not important what the participant thinks that Heinz should do. Kohlberg’s theory holds that the justification the participant offers is what is significant, the form of their response. Below are some of many examples of possible arguments that belong to the six stages:

**Stage one (obedience):** Heinz should not steal the medicine because he would consequently be put in prison, which would mean he is a bad person. Or: Heinz should steal the medicine because it is only worth $200, not how much the druggist wanted for it. Heinz had even offered to pay for it and was not stealing anything else.

**Stage two (self-interest):** Heinz should steal the medicine because he will be much happier if he saves his wife, even if he will have to serve a prison sentence. Or: Heinz should not steal the medicine because prison is an awful place, and he would probably experience anguish over a jail cell more than his wife's death.

**Stage three (conformity):** Heinz should steal the medicine because his wife expects it; he wants to be a good husband. Or: Heinz should not steal the drug because stealing is bad and he is not a criminal; he tried to do everything he could without breaking the law, you cannot blame him.

**Stage four (law-and-order):** Heinz should not steal the medicine because the law prohibits stealing, making it illegal. Or: Heinz should steal the drug for his wife but also take the prescribed punishment for the crime as well as paying the druggist what he is owed. Criminals cannot just run around without regard for the law; actions have consequences.
Stage five (human rights): Heinz should steal the medicine because everyone has a right to choose life, regardless of the law. Or: Heinz should not steal the medicine because the scientist has a right to fair compensation. Even if his wife is sick, it does not make his actions right.

Stage six (universal human ethics): Heinz should steal the medicine, because saving a human life is a more fundamental value than the property rights of another person. Or: Heinz should not steal the medicine, because others may need the medicine just as badly, and their lives are equally significant.

Criticisms

One criticism of Kohlberg’s theory is that it emphasizes justice to the exclusion of other values, and so may not adequately address the arguments of those who value other moral aspects of actions. Carol Gilligan has argued that Kohlberg’s theory is overly androcentric. Kohlberg’s theory was initially developed based on empirical research using only male participants; Gilligan argued that it did not adequately describe the concerns of women. Although research has generally found no significant pattern of differences in moral development between sexes, Gilligan’s theory of moral development does not focus on the value of justice. She developed an alternative theory of moral reasoning based on the ethics of caring. Critics such as Christina Hoff Sommers, however, argued that Gilligan’s research is ill-founded, and that no evidence exists to support her conclusion.

Kohlberg’s stages are not culturally neutral, as demonstrated by its application to a number of different cultures. Although they progress through the stages in the same order, individuals in different cultures seem to do so at different rates. Kohlberg has responded by saying that although different cultures do indeed inculcate different beliefs, his stages correspond to underlying modes of reasoning, rather than to those beliefs.

Other psychologists have questioned the assumption that moral action is primarily a result of formal reasoning. Social intuitionists such as Jonathan Haidt, for example, argue that individuals often make moral judgments without weighing concerns such as fairness, law, human rights, or abstract ethical values. Thus the arguments analyzed by Kohlberg and other rationalist psychologists could be considered post hoc rationalizations of intuitive decisions; moral reasoning may be less relevant to moral action than Kohlberg’s theory suggests.

Continued relevance

Kohlberg’s body of work on the stages of moral development has been utilized by others working in the field. One example is the Defining Issues Test (DIT) created in 1979 by James Rest, originally as a pencil-and-paper alternative to the Moral
Judgement Interview. Heavily influenced by the six-stage model, it made efforts to improve the validity criteria by using a quantitative test, the Likert scale, to rate moral dilemmas similar to Kohlberg's. It also used a large body of Kohlbergian theory such as the idea of "post-conventional thinking". In 1999 the DIT was revised as the DIT-2; the test continues to be used in many areas where moral testing is required, such as divinity, politics, and medicine.

Piaget's theory of cognitive development

Piaget's theory of cognitive development is a comprehensive theory about the nature and development of human intelligence first developed by Jean Piaget. It is primarily known as a developmental stage theory, but in fact, it deals with the nature of knowledge itself and how humans come gradually to acquire it, construct it, and use it. Moreover, Piaget claims the idea that cognitive development is at the centre of human organism and language is contingent on cognitive development. Below, there is first a short description of Piaget's views about the nature of intelligence and then a description of the stages through which it develops until maturity.

The Nature of Intelligence: Operative and Figurative Intelligence

Piaget believed that reality is a dynamic system of continuous change, and as such is defined in reference to the two conditions that define dynamic systems that change. Specifically, he argued that reality involves transformations and states. Transformations refer to all manners of changes that a thing or person can undergo. States refer to the conditions or the appearances in which things or persons can be found between transformations. For example, there might be changes in shape or form (for instance, liquids are reshaped as they are transferred from one vessel to another, humans change in their characteristics as they grow older), in size (e.g., a series of coins on a table might be placed close to each other or far apart) in placement or location in space and time (e.g., various objects or persons might be found at one place at one time and at a different place at another time). Thus, Piaget argued, that if human intelligence is to be adaptive, it must have functions to represent both the transformational and the static aspects of reality. He proposed that operative intelligence is responsible for the representation and manipulation of the dynamic or transformational aspects of reality and that figurative intelligence is responsible for the representation of the static aspects of reality.

Operative intelligence is the active aspect of intelligence. It involves all actions, overt or covert, undertaken in order to follow, recover, or anticipate the transformations of the objects or persons of interest. Figurative intelligence is the more or less static aspect of intelligence, involving all means of representation used to retain in mind the states (i.e., successive forms, shapes, or locations) that intervene between transformations. That is, it involves perception, imitation, mental imagery, drawing,
and language. Therefore, the figurai aspects of intelligence derive their meaning from the operative aspects of intelligence, because states cannot exist independently of the transformations that interconnect them. Piaget believed that the figurai or the representational aspects of intelligence are subservient to its operative and dynamic aspects, and therefore, that understanding essentially derives from the operative aspect of intelligence.

At any time, operative intelligence frames how the world is understood and it changes if understanding is not successful. Piaget believed that this process of understanding and change involves two basic functions: Assimilation and accommodation.

**Assimilation and Accommodation**

Through studying the field of education Piaget focused on accommodation and assimilation. Assimilation, one of two processes coined by Jean Piaget, describes how humans perceive and adapt to new information. It is the process of taking one's environment and new information and fitting it into pre-existing cognitive schemas. Assimilation occurs when humans are faced with new or unfamiliar information and refer to previously learned information in order to make sense of it. Accommodation, unlike assimilation is the process of taking one's environment and new information, and altering one's pre-existing schemas in order to fit in the new information.

With the disciplining of psychology came the methods approaching psychologist's observations towards internalizing the technical means in knowing what terms processes like assimilation can be thought in. The term 'assimilation' was derived in this manner and defined explicitly as one's own perspective on an issue that anchors all other perspectives. Judging the stimuli close to that anchor (the 'latitude of acceptance') will always assimilate easier, while stimuli further from one's perspective anchor (the 'latitude of rejection') manages to take a longer time in assimilating. This particular form of social and psychological judgment is referenced within disciplined psychology as the "assimilation-contrast model." Jean Piaget first discovered this as a result of observing his infant son "grab and thrust" a rattle into his mouth and then assimilated the "grab and thrust" motion, also placing Piaget's expensive watch into his mouth.

Through a series of stages, Piaget explains the ways in which characteristics are constructed that lead to specific types of thinking; this chart is called Cognitive Development. To Piaget, assimilation is integrating external elements into structures of lives or environments or those we could have through experience. It is through assimilation that accommodation is derived. Accommodation is imperative because it is how people will continue to interpret new concepts, schemas, frameworks, etc. Assimilation is different than accommodation because of how it
relates to the inner organism due to the environment. Piaget believes that the human brain has been programmed through evolution to bring equilibrium, and to move upwards in a process to equilibrate what is not. The equilibrium is what Piaget believes ultimately influences structures because of the internal and external processes through assimilation and accommodation.

Piaget’s understanding is that these two functions cannot exist without the other. To assimilate an object into an existing mental schema, one first needs to take into account or accommodate to the particularities of this object to a certain extent; for instance, to recognize (assimilate) an apple as an apple one needs first to focus (accommodate) on the contour of this object. To do this one needs to roughly recognize the size of the object. Development increases the balance or equilibration between these two functions. When in balance with each other, assimilation and accommodation generate mental schemas of the operative intelligence. When one function dominates over the other, they generate representations which belong to figurative intelligence.

Following from this conception Piaget theorized that intelligence is active and constructive. It is active in the literal sense of the term as it depends on the actions (overt or covert, assimilatory or accommodatory), which the thinker executes in order to build and rebuild his models of the world. It is also constructive because actions, particularly mental actions, are coordinated into more inclusive and cohesive systems, thus they are raised to more stable and effective levels of functioning. Piaget believed that this process of construction leads to systems of mental operations better able to resist the illusions of perceptual appearances and thus less prone to error. In other words, the gradual construction of the system of mental operations involved in the operative aspect of intelligence enables the developing person to grasp more hidden and complex aspects of the world. Below we will summarize the development of operative intelligence.

Piaget’s four stages According to Jean Piaget’s theory of cognitive development, intelligence is the basic mechanism of ensuring equilibrium in the relations between the person and the environment. This is achieved through the actions of the developing person on the world. At any moment in development, the environment is assimilated in the schemes of action that are already available and these schemes are transformed or accommodated to the peculiarities of the objects of the environment plus of the surroundings and entire universe, if they are not completely appropriate. Thus, the development of intelligence is a continuous process of assimilations and accommodations that lead to increasing expansion of the field of application of schemes, increasing coordination between them, increasing interiorization, and increasing abstraction. The mechanism underlying this process of increasing abstraction, interiorization, and coordination is reflecting abstraction. That is, reflecting abstraction gradually leads to the rejection of the external action components of sensorimotor operations on objects and to the
preservation of the mental, planning or anticipatory, components of operation. These are the mental operations that are gradually coordinated with each other, generating structures of mental operations. These structures of mental operations are applied on representations of objects rather than on the objects themselves. Language, mental images, and numerical notation are examples of representations standing for objects and thus they become the object of mental operations. Moreover, mental operations, with development, become reversible. For instance, the counting of a series of objects can go both forward and backward with the understanding that the number of objects counted is not affected by the direction of counting because the same number can be retrieved both ways. Piaget described four main periods in the development towards completely reversible equilibrated thought structures. These are the periods described below. As shown below, for Piaget intelligence is not the same at different ages. It changes qualitatively, attaining increasingly broader, more abstract, and more equilibrated structures thereby allowing access to different levels of organization of the world.

Sensorimotor stage

The sensorimotor stage is the first of the four stages in cognitive development which "extends from birth to the acquisition of language". "In this stage, infants construct an understanding of the world by coordinating sensory experiences (such as seeing and hearing) with physical, motoric actions. Infants gain knowledge of the world from the physical actions they perform on it. An infant progresses from reflexive, instinctual action at birth to the beginning of symbolic thought toward the end of the stage. Piaget divided the sensorimotor stage into six sub-stages":0–2 years, Infants just have senses—vision, hearing, and motor skills, such as grasping, sucking, and stepping.---from Psychology Study Guide by Bernstein, Penner, Clarke-Stewart, Roy.

Sub-Stages

1 Simple Reflexes

Birth-6 weeks

"Coordination of sensation and action through reflexive behaviors". Three primary reflexes are described by Piaget: sucking of objects in the mouth, following moving or interesting objects with the eyes, and closing of the hand when an object makes contact with the palm (palmar grasp). Over the first six weeks of life, these reflexes begin to become voluntary actions; for example, the palmar reflex becomes intentional grasping.

2 First habits and primary circular reactions phase
6 weeks-4 months

"Coordination of sensation and two types of schemes: habits (reflex) and primary circular reactions (reproduction of an event that initially occurred by chance). Main focus is still on the infant’s body." As an example of this type of reaction, an infant might repeat the motion of passing their hand before their face. Also at this phase, passive reactions, caused by classical or operant conditioning, can begin.

3 Secondary circular reactions phase

4–8 months

Development of habits. "Infants become more object-oriented, moving beyond self-preoccupation; repeat actions that bring interesting or pleasurable results." This stage is associated primarily with the development of coordination between vision andprehension. Three new abilities occur at this stage: intentional grasping for a desired object, secondary circular reactions, and differentiations between ends and means. At this stage, infants will intentionally grasp the air in the direction of a desired object, often to the amusement of friends and family. Secondary circular reactions, or the repetition of an action involving an external object begin; for example, moving a switch to turn on a light repeatedly. The differentiation between means and ends also occurs. This is perhaps one of the most important stages of a child’s growth as it signifies the dawn of logic.

4 Coordination of secondary circular reactions stages

8–12 months

"Coordination of vision and touch-hand-eye coordination; coordination of schemes and intentionality." This stage is associated primarily with the development of logic and the coordination between means and ends. This is an extremely important stage of development, holding what Piaget calls the "first proper intelligence." Also, this stage marks the beginning of goal orientation, the deliberate planning of steps to meet an objective.

5 Tertiary circular reactions, novelty, and curiosity

12–18 months

"Infants become intrigued by the many properties of objects and by the many things they can make happen to objects; they experiment with new behavior." This stage is associated primarily with the discovery of new means to meet goals. Piaget
describes the child at this juncture as the "young scientist," conducting pseudo-experiments to discover new methods of meeting challenges.

6 Internalization of Schemes

18–24 months

"Infants develop the ability to use primitive symbols and form enduring mental representations." This stage is associated primarily with the beginnings of insight, or true creativity. This marks the passage into the preoperational stage.

By the end of the sensorimotor period, objects are both separate from the self and permanent. Object permanence is the understanding that objects continue to exist even when they cannot be seen, heard, or touched. Acquiring the sense of object permanence is one of the infant's most important accomplishments, according to Piaget.

Preoperational stage

The preoperative stage is the second of four stages of cognitive development. By observing sequences of play, Piaget was able to demonstrate that towards the end of the second year, a qualitatively new kind of psychological functioning occurs.

(Pre)Operatory Thought is any procedure for mentally acting on objects. The hallmark of the preoperational stage is sparse and logically inadequate mental operations. During this stage, the child learns to use and to represent objects by images, words, and drawings. The child is able to form stable concepts as well as mental reasoning and magical beliefs. The child however is still not able to perform operations; tasks that the child can do mentally rather than physically. Thinking is still egocentric: The child has difficulty taking the viewpoint of others. Two substages can be formed from preoperative thought.

The Symbolic Function Substage

Occurs between about the ages of 2 and 7. During 2-4 years old, kids cannot yet manipulate and transform information in logical ways, but they now can think in images and symbols. The child is able to formulate designs of objects that are not present. Other examples of mental abilities are language and pretend play. Although there is an advancement in progress, there are still limitations such as egocentrism and animism. Egocentrism occurs when a child is unable to distinguish between their own perspective and that of another person's. Children tend to pick their own view of what they see rather than the actual view shown to others. An example is an experiment performed by Piaget and Barbel Inhelder. Three views of a mountain are shown and the child is asked what a traveling doll would see at the various angles;

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the child picks their own view compared to the actual view of the doll. Animism is the belief that inanimate objects are capable of actions and have lifelike qualities. An example is a child believing that the sidewalk was mad and made them fall down.

**The Intuitive Thought Substage**

Occurs between about the ages of 4 and 7. Children tend to become very curious and ask many questions; begin the use of primitive reasoning. There is an emergence in the interest of reasoning and wanting to know why things are the way they are. Piaget called it the intuitive substage because children realize they have a vast amount of knowledge but they are unaware of how they know it. Centration and conservation are both involved in preoperative thought. Centration is the act of focusing all attention on one characteristic compared to the others. Centration noticed in conservation; the awareness that altering a substance’s appearance does not change its basic properties. Children at this stage are unaware of conservation. In Piaget’s most famous task, a child is presented with two identical beakers containing the same amount of liquid. The child usually notes that the beakers have the same amount of liquid. When one of the beakers is poured into a taller and thinner container, children who are typically younger than 7 or 8 years old say that the two beakers now contain a different amount of liquid. The child simply focuses on the height and width of the container compared to the general concept. Piaget believes that if a child fails the conservation-of-liquid task, it is a sign that they are at the preoperational stage of cognitive development. The child also fails to show conservation of number, matter, length, volume, and area as well. Another example is when a child is shown 7 dogs and 3 cats and asked if there are more dogs than cats. The child would respond positively. However when asked if there are more dogs than animals, the child would once again respond positively. Such fundamental errors in logic show the transition between intuitiveness in solving problems and true logical reasoning acquired in later years when the child grows up.

Piaget considered that children primarily learn through imitation and play throughout these first two stages, as they build up symbolic images through internalized activity.

Studies have been conducted among other countries to find out if Piaget’s theory is universal. Psychologist Patricia Greenfield conducted a task similar to Piaget’s beaker experiment in the West African nation of Senegal. Her results stated that only 50 percent of the 10-13 year old understood the concept of conservation. Other cultures such as central Australia and New Guinea had similar results. If adults had not gained this concept, they would be unable to understand the point of view of another person. There may have been discrepancies in the communication between the experimenter and the children which may have altered the results. It has also been found that if conservation is not widely practiced in a particular country, the concept can be taught to the child and training can improve the child’s
understanding. Therefore, it is noted that there are different age differences in reaching the understanding of conservation base on the degree to which the culture teaches these tasks.

**Concrete operational stage**

The concrete operational stage is the third of four stages of cognitive development in Piaget’s theory. This stage, which follows the preoperational stage, occurs between the ages of 7 and 11 years and is characterized by the appropriate use of logic. Important processes during this stage are:

**Seriation**—the ability to sort objects in an order according to size, shape, or any other characteristic. For example, if given different-shaded objects they may make a color gradient.

**Transitivity**- The ability to recognize logical relationships among elements in a serial order, and perform 'transitive inferences' (for example, if A is taller than B, and B is taller than C, then A must be taller than C).

**Classification**—the ability to name and identify sets of objects according to appearance, size or other characteristic, including the idea that one set of objects can include another.

**Decentering**—where the child takes into account multiple aspects of a problem to solve it. For example, the child will no longer perceive an exceptionally wide but short cup to contain less than a normally-wide, taller cup.

**Reversibility**—the child understands that numbers or objects can be changed, then returned to their original state. For this reason, a child will be able to rapidly determine that if 4+4 equals 8, then 8−4 will equal 4, the original quantity.

**Conservation**—understanding that quantity, length or number of items is unrelated to the arrangement or appearance of the object or items.

**Elimination of Egocentrism**—the ability to view things from another’s perspective (even if they think incorrectly). For instance, show a child a comic in which Jane puts a doll under a box, leaves the room, and then Melissa moves the doll to a drawer, and Jane comes back. A child in the concrete operations stage will say that Jane will still think it’s under the box even though the child knows it is in the drawer. (See also False-belief task).

Children in this stage can, however, only solve problems that apply to actual (concrete) objects or events, and not abstract concepts or hypothetical tasks.

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**Formal operational stage**

The formal operational period is the fourth and final of the periods of cognitive development in Piaget’s theory. This stage, which follows the Concrete Operational stage, commences at around 11 years of age (puberty) and continues into adulthood. In this stage, individuals move beyond concrete experiences and begin to think abstractly, reason logically and draw conclusions from the information available, as well as apply all these processes to hypothetical situations. The abstract quality of the adolescent’s thought at the formal operational level is evident in the adolescent’s verbal problem solving ability. The logical quality of the adolescent’s thought is when children are more likely to solve problems in a trial-and-error fashion. Adolescents begin to think more as a scientist thinks, devising plans to solve problems and systematically testing solutions. They use hypothetical-deductive reasoning, which means that they develop hypotheses or best guesses, and systematically deduce, or conclude, which is the best path to follow in solving the problem. During this stage the adolescent is able to understand such things as love, "shades of gray", logical proofs and values. During this stage the young person begins to entertain possibilities for the future and is fascinated with what they can be. Adolescents are changing cognitively also by the way that they think about social matters. Adolescent Egocentrism governs the way that adolescents think about social matters and is the heightened self-consciousness in them as they are which is reflected in their sense of personal uniqueness and invincibility. Adolescent egocentrism can be dissected into two types of social thinking, Imaginary audience that involves attention getting behavior, and personal fable which involves an adolescent’s sense of personal uniqueness and invincibility.

**The Stages and Causation**

Piaget sees children’s conception of causation as a march from "primitive" conceptions of cause to those of a more scientific, rigorous, and mechanical nature. These primitive concepts are characterized as magical, with a decidedly nonnatural or nonmechanical tone. Piaget attributes this to his most basic assumption: that babies are phenomenists. That is, their knowledge "consists of assimilating things to schemas" from their own action such that they appear, from the child’s point of view, "to have qualities which in fact stem from the organism." Consequently, these "subjective conceptions," so prevalent during Piaget’s first stage of development, are dashed upon discovering deeper empirical truths. Piaget gives the example of a child believing the moon and stars follow him on a night walk; upon learning that such is the case for his friends, he must separate his self from the object, resulting in a theory that the moon is immobile, or moves independently of other agents. The second stage, from around three to eight years of age, is characterized by a mix of this type of magical, animistic, or "nonnatural" conceptions of causation and mechanical or "naturalisitic" causation. This conjunction of natural and nonnatural causal explanations supposedly stems from experience itself, though Piaget does not
make much of an attempt to describe the nature of the differences in conception; in his interviews with children, he asked specifically about natural phenomena: what makes clouds move? What makes the stars move? Why do rivers flow? The nature of all the answers given, Piaget says, are such that these objects must perform their actions to "fulfill their obligations towards men." He calls this "moral explanation."

**Challenges to Piagetian stage theory**

Piagetians' accounts of development have been challenged on several grounds. First, as Piaget himself noted, development does not always progress in the smooth manner his theory seems to predict. 'Decalage', or unpredicted gaps in the developmental progression, suggest that the stage model is at best a useful approximation. More broadly, Piaget's theory is 'domain general', predicting that cognitive maturation occurs concurrently across different domains of knowledge (such as mathematics, logic, understanding of physics, of language, etc.). During the 1980s and 1990s, cognitive developmentalists were influenced by "neo-nativist" and evolutionary psychology ideas. These ideas de-emphasized domain general theories and emphasized domain specificity or modularity of mind. Modularity implies that different cognitive faculties may be largely independent of one another and thus develop according to quite different time-tables. In this vein, some cognitive developmentalists argued that rather than being domain general learners, children come equipped with domain specific theories, sometimes referred to as 'core knowledge', which allows them to break into learning within that domain. For example, even young infants appear to be sensitive to some predictable regularities in the movement and interactions of objects (e.g. that one object cannot pass through another), or in human behavior (e.g. that a hand repeatedly reaching for an object has that object, not just a particular path of motion), as its be the building block out of which more elaborate knowledge is constructed. More recent work has strongly challenged some of the basic presumptions of the 'core knowledge' school, and revised ideas of domain generality—but from a newer dynamic systems approach, not from a revised Piagetian perspective. Dynamic systems approaches harken to modern neuroscientific research that was not available to Piaget when he was constructing his theory. One important finding is that domain-specific knowledge is constructed as children develop and integrate knowledge. This suggests more of a "smooth integration" of learning and development than either Piaget, or his neo-nativist critics, had envisioned. Additionally, some psychologists, such as Vygotsky and Jerome Bruner, thought differently from Piaget, suggesting that language was more

**Post Piagetian and Neo-Piagetian stages**

In the recent years, several scholars attempted to ameliorate the problems of Piaget’s theory by developing new theories and models that can accommodate
evidence that violates Piagetian predictions and postulates. These models are summarized below.

The neo-Piagetian theories of cognitive development, advanced by Case, Demetriou, Halford, Fischer, and Pascual-Leone, attempted to integrate Piaget’s theory with cognitive and differential theories of cognitive organization and development. Their aim was to better account for the cognitive factors of development and for intra-individual and inter-individual differences in cognitive development. They suggested that development along Piaget’s stages is due to increasing working memory capacity and processing efficiency. Moreover, Demetriou’s theory ascribes an important role to hypercognitive processes of self-recording, self-monitoring, and self-regulation and it recognizes the operation of several relatively autonomous domains of thought (Demetriou, 1998; Demetriou, Mouyi, Spanoudis, 2010).

Postformal stages have been proposed. Kurt Fischer suggested two, Michael Commons presents evidence for four postformal stages: the systematic, metasystematic, paradigmatic and cross paradigmatic. (Commons & Richards, 2003; Oliver, 2004).

A "sentential" stage has been proposed, said to occur before the early preoperational stage. Proposed by Fischer, Biggs and Biggs, Commons, and Richards.

Searching for a micro-physiological basis for human mental capacity, Traill (1978, Section C5.4 ; - 1999, Section 8.4 ) proposed that there may be "pre-sensorimotor" stages ("M–1L", "M–2L", ... ) — developed in the womb and/or transmitted genetically.

Postulated physical mechanisms underlying "schemes" and stages

Piaget himself (1967) considered the possibility of RNA molecules as likely embodiments of his still-abstract "schemes" (which he promoted as units of action) — though he did not come to any firm conclusion. At that time, due to work such as that of Holger Hydén, RNA concentrations had indeed been shown to correlate with learning, so the idea was quite plausible.

However, by the time of Piaget’s death in 1980, this notion had lost favour. One main problem was over the protein which (it was assumed) such RNA would necessarily produce, and that did not fit in with observation. It then turned out, surprisingly, that only about 3% of RNA does code for protein (Mattick, 2001, 2003, 2004). Hence most of the remaining 97% (the "ncRNA") could now theoretically be available to serve as Piagetian schemes (or other regulatory roles now under investigation). The issue has not yet been resolved experimentally, but its theoretical aspects have been reviewed; (Traill 2005 / 2008).

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Genetic epistemology

Genetic epistemology is a study of the origins (genesis) of knowledge (epistemology). The discipline was established by Jean Piaget.

The goal of genetic epistemology is to link the validity of knowledge to the model of its construction. In other words, it shows that the method in which the knowledge was obtained/created affects the validity of that knowledge. For example, our direct experience with gravity makes our knowledge of it more valid than our indirect experience with black holes.

Genetic epistemology also explains the process of how a human being develops cognitively from birth throughout his or her life through four primary stages of development: sensorimotor (birth to age 2), preoperational (2-7), concrete operational (7-11), and formal operational (11 years onward). The main focus is on the younger years of development.

Progress from one stage to another comes by way of a process of development. Assimilation, which occurs when the perception of a new event or object occurs to the learner in an existing schema and is usually used in the context of self motivation. Accommodation, one accommodates the experiences according to the outcome of the tasks. The highest form of development is equilibration. Equilibration encompasses both assimilation and accommodation as the learner changes their way of thinking in order to arrive at a correct or different answer. This is the upper level of development.

Jean Piaget did not consider himself a psychologist - instead he called his study Genetic Epistemology. In contemporary English, genetics refers to the functions of heredity, rather than the more broad reference to biological concerns. Contemporary reference to his studies would more likely give you the terminology ‘developmental theory of knowledge’. Piaget believed that knowledge is a biological function that results from the actions of an individual and is borne out of change and transformation. He also stated that knowledge consists of structures, and comes about by the adaptation of these structures with the environment.

From the standpoint of logic, Piaget's genetic epistemology is a half-way house between formal logic and dialectical logic; from the standpoint of epistemology, Piaget's genetic epistemology is a half-way house between objective idealism and materialism.

Piaget's Schema Theory
Thought passes through a series of stages of development; at each stage there applies formal logic at a specific stage of differentiation which may be characterized by an algebra in which exactly such-and-such a mathematical structure applies, corresponding to the axioms of logic at that stage; this logic is manifested first in actions, then at a relatively early stage in sensorimotor operations (in the specific mathematical sense of the word, as opposed to "actions" which are equivalent to relations but not yet mathematical operations), and finally in operations which express thoughts, conscious purposive activity.

The material basis for transition from sensorimotor intelligence to representation and from representation to conceptual thought is the interiorisation of practical activity.

The successive stages of concepts manifested in child development imply relations of deduction in mathematical logic and in the development of thinking in other planes of development, such as in the history of science and the history of knowledge in the anthropological domain.

Piaget draws on the full range of contemporary mathematical knowledge, a vast empirical base of observation of the learning of very young children built up at his institute and reports of observations of older children and a general knowledge of the development of knowledge in history.

(1) From the standpoint of dialectical logic, we must agree that at each stage of development, at each "definition of the Absolute" in Hegel’s terminology, formal logic is applicable. Piaget's proof of this is striking, and his demonstration of how the stages of development in child thought pass through a specific series which is deductive in a specific sense from the standpoint of mathematics is original and profound.

However, from the standpoint of understanding development (and this is Piaget's standpoint), what is important is not the definition of each stage but the transition from one to the next; and for this it is necessary to demonstrate the internal contradiction within the logic of that plane.

Since Piaget draws on mathematical logic more developed than what was known to Hegel, it will be necessary to investigate these structures to see if this speculative proposition proves to be valid.

(2) The concept of interiorisation is indeed the basis of the materialist view of the development of thought. However, Piaget, as a professional child-psychologist falls prey to the objective idealism of any professional, of elevating the subject matter of his particular profession from being an aspect of the material world to being its master. [The charge of objective idealism is qualified, for Piaget is quite
unambiguous that relations conceived of in thought exist objectively in the material world].

Thus, since his body of authoritative empirical work is in relation to early childhood development, he imposes the schema appropriate to this semi-human subject on to adolescent development, speculates on its possible reflection in anthropological development and confounds it with the history of development of science and philosophy. I say "confounds" because Piaget is aware that his schemas do not seem to apply in this domain. In this sense, the charge of objective idealism would seem unfair, but from confounding he does not go further and seek the implication of this lack of correspondence, but seeks to minimize it.

By focusing on early childhood (as indeed he must; that is his profession, and his institute has contributed a vast body of empirical material), Piaget sees what is biologically (zoologically?) human but not what is socially (historically) human, and humanity is essentially social, after all.

(3) On the plus side, it has to be said that Piaget deals once and for all with any idea of innate intelligence, and makes fully convincing the prospect of a fully genetic (i.e. developmental) elaboration of intelligence, assuming only animal instincts such as grasping and sucking and sensorimotor "equipment" capable of reflecting highly developed relations. A weakness in Piaget's theory could be that there isn't proof in how one transitions from one stage to the next. Can someone progress from one stage forward, but revert backwards, and then move forward again?

**Types of knowledge**

Piaget proposes three types of knowledge: physical, logical mathematical, and social knowledge.

**Physical knowledge:** It refers to knowledge related to objects in the world, which can be acquired through perceptual properties. The acquisition of physical knowledge has been equated with learning in Piaget's theory (Gruber and Voneche, 1995). In other words thought is fit directly to experience.

"Piaget also called his view constructivism, because he firmly believed that knowledge acquisition is a process of continuous self-construction. That is, Knowledge is not out there, external to the child and waiting to be discovered. But neither is it wholly performed within the child, ready to emerge as the child develops with the world surrounding her...Piaget believed that children actively approach their environments and acquire knowledge through their actions."²

"Piaget distinguished among thee types of knowledge that children acquire: Physical, logical-mathematical, and social knowledge. Physical knowledge, also
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called empirical knowledge, has to do with knowledge about objects in the world, which can be gained through their perceptual properties...Logical-Mathematical knowledge is abstract and must be invented, but through actions on objects that are fundamentally different from those actions enabling physical knowledge...Social Knowledge is culture-specific and can be learned only from other people within one's cultural group.

Psychosexual development

In Freudian psychology, psychosexual development is a central element of the psychoanalytic sexual drive theory, that human beings, from birth, possess an instinctual libido (sexual appetite) that develops in five stages. Each stage — the oral, the anal, the phallic, the latent, and the genital — is characterized by the erogenous zone that is the source of the libidinal drive. Sigmund Freud proposed that if the child experienced anxiety, thwarting his or her sexual appetite during any libidinal (psychosexual) development stage, said anxiety would persist into adulthood as a neurosis, a functional mental disorder.

Background

The neurologist Sigmund Freud (ca. 1921)

Sigmund Freud (1856-1939) observed that during the predictable stages of early childhood development, the child’s behavior is oriented towards certain parts of his or her body, e.g. the mouth during breast-feeding, the anus during toilet-training. He proposed that adult neurosis (functional mental disorder) often is rooted in childhood sexuality, therefore, said neurotic adult behaviors were manifestations of childhood sexual fantasy and desire. That because human beings are born "polymorphously perverse", infants can derive sexual pleasure from any part of their bodies, and that socialization directs the instinctual libidinal drives into adult heterosexuality. Given the predictable timeline of childhood behavior, he proposed "libido development" as a model of normal childhood sexual development, wherein the child progresses through five psychosexual stages — (i) the oral, (ii) the anal, (iii) the phallic, (iv) the latent, and (v) the genital — in which the source pleasure is in a different erogenous zone.

Freudian psychosexual development

Sexual infantilism... In pursuing and satisfying his or her libido (sexual drive), the child might experience failure (parental and societal disapproval) and thus might associate anxiety with the given erogenous zone. To avoid anxiety, the child becomes fixated, preoccupied with the psychologic themes related to the erogenous zone in question, which persist into adulthood, and underlie the personality and

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psychopathology of the man or woman, as neurosis, hysteria, personality disorders, et cetera.

**Stages**

**Oral**

*Birth–1 year*

*Mouth*

- Orally aggressive: chewing gum and the ends of pencils, etc.
- Orally Passive: smoking, eating, kissing, oral sexual practices
- Oral stage fixation might result in a passive, gullible, immature, manipulative personality.

**Anal**

*1–3 years*

*Bowel and bladder elimination*

- Anal retentive: Obsessively organized, or excessively neat
- Anal expulsive: reckless, careless, defiant, disorganized, coprophilic

**Phallic**

*3–6 years*

*Genitalia*

*Oedipus complex (in boys)*

*Electra complex (in girls)*

**Latency** 6–puberty

- Dormant sexual feelings
- Sexual unfulfillment if fixation occurs in this stage.

**Genital**

*Puberty–death*
Sexual interests mature
- Frigidity, impotence, unsatisfactory relationships

**Oral stage**

The first stage of psychosexual development is the oral stage, spanning from birth until the age of two years, wherein the infant’s mouth is the focus of libidinal gratification derived from the pleasure of feeding at the mother’s breast, and from the oral exploration of his or her environment, i.e. the tendency to place objects in the mouth. The id dominates, because neither the ego nor the super ego is yet fully developed, and, since the infant has no personality (identity), every action is based upon the pleasure principle. Nonetheless, the infantile ego is forming during the oral stage; two factors contribute to its formation: (i) in developing a body image, he or she is discrete from the external world, e.g. the child understands pain when it is applied to his or her body, thus identifying the physical boundaries between body and environment; (ii) experiencing delayed gratification leads to understanding that specific behaviors satisfy some needs, e.g. crying gratifies certain needs.
Weaning is the key experience in the infant’s oral stage of psychosexual development, his or her first feeling of loss consequent to losing the physical intimacy of feeding at mother’s breast. Yet, weaning increases the infant’s self-awareness that he or she does not control the environment, and thus learns of delayed gratification, which leads to the formation of the capacities for independence (awareness of the limits of the self) and trust (behaviors leading to gratification). Yet, thwarting of the oral-stage — too much or too little gratification of desire — might lead to an oral-stage fixation, characterised by passivity, gullibility, immaturity, unrealistic optimism, which is manifested in a manipulative personality consequent to ego malformation. In the case of too much gratification, the child does not learn that he or she does not control the environment, and that gratification is not always immediate, thereby forming an immature personality. In the case of too little gratification, the infant might become passive upon learning that gratification is not forthcoming, despite having produced the gratifying behavior.

**Anal stage**

The second stage of psychosexual development is the anal stage, spanning from the age of fifteen months to three years, wherein the infant’s erogenous zone changes from the mouth (the upper digestive tract) to the anus (the lower digestive tract), while the ego formation continues. Toilet training is the child’s key anal-stage experience, occurring at about the age of two years, and results in conflict between the Id (demanding immediate gratification) and the Ego (demanding delayed gratification) in eliminating bodily wastes, and handling related activities (e.g. manipulating excrement, coping with parental demands). The style of parenting influences the resolution of the Id–Ego conflict, which can be either gradual and psychologically uneventful, or which can be sudden and psychologically traumatic. The ideal resolution of the Id–Ego conflict is in the child’s adjusting to moderate parental demands that teach the value and importance of physical cleanliness and environmental order, thus producing a self-controlled adult. Yet, if the parents make immoderate demands of the child, by over-emphasizing toilet training, it might lead to the development of a compulsive personality, a person too concerned with neatness and order. If the child obeys the Id, and the parents yield, he or she might develop a self-indulgent personality characterized by personal slovenliness and environmental disorder. If the parents respond to that, the child must comply, but might develop a weak sense of Self, because it was the parents’ will, and not the child’s ego, who controlled the toilet training.

**Phallic stage**

The third stage of psychosexual development is the phallic stage, spanning the ages of three to six years, wherein the child’s genitalia are his or her primary erogenous zone. It is in this third infantile development stage that children become aware of...
their bodies, the bodies of other children, and the bodies of their parents; they gratify physical curiosity by undressing and exploring each other and their genitals, and so learn the physical (sexual) differences between "male" and "female" and the gender differences between "boy" and "girl". In the phallic stage, a boy’s decisive psychosexual experience is the Oedipus complex, his son–father competition for possession of mother. This psychological complex derives from the 5th-century BC Greek mythologic character Oedipus, who unwittingly killed his father, Laius, and sexually possessed his mother, Jocasta. Analogously, in the phallic stage, a girl’s decisive psychosexual experience is the Electra complex, her daughter–mother competition for psychosexual possession of father. This psychological complex derives from the 5th-century BC Greek mythologic Electra, who plotted matricidal revenge with Orestes, her brother, against Clytemnestra, their mother, and Aegisthus, their stepfather, for their murder of Agamemnon, their father, (cf. Electra, by Sophocles).

Initially, Freud equally applied the Oedipus complex to the psychosexual development of boys and girls, but later developed the female aspects of the theory as the feminine Oedipus attitude and the negative Oedipus complex; yet, it was his student–collaborator, Carl Jung, who coined the term Electra complex in 1913. Nonetheless, Freud rejected Jung’s term as psychoanalytically inaccurate: “that what we have said about the Oedipus complex applies with complete strictness to the male child only, and that we are right in rejecting the term ’Electra complex’, which seeks to emphasize the analogy between the attitude of the two sexes”.

Oedipus complex: Oedipus explains the riddle of the Sphinx, Jean Auguste Dominique Ingres. (ca. 1805)
Oedipus — Despite mother being the parent who primarily gratifies the child’s desires, the child begins forming a discrete sexual identity — "boy," "girl" — that alters the dynamics of the parent and child relationship; the parents become the focus of infantile libidinal energy. The boy focuses his libido (sexual desire) upon his mother, and focuses jealousy and emotional rivalry against his father — because it is he who sleeps with mother. To facilitate uniting him with his mother, the boy’s id wants to kill father (as did Oedipus), but the ego, pragmatically based upon the
reality principle, knows that the father is the stronger of the two males competing to possess the one female. Nevertheless, the boy remains ambivalent about his father's place in the family, which is manifested as fear of castration by the physically greater father; the fear is an irrational, subconscious manifestation of the infantile Id.

**Electra** — Whereas boys develop castration anxiety, girls develop penis envy that is rooted in anatomic fact: without a penis, she cannot sexually possess mother, as the infantile id demands. Resultantly, the girl redirects her desire for sexual union upon father; thus, she progresses towards heterosexual femininity that culminates in bearing a child who replaces the absent penis. Moreover, after the phallic stage, the girl’s psychosexual development includes transferring her primary erogenous zone from the infantile clitoris to the adult vagina. Freud thus considered a girl’s Oedipal conflict to be more emotionally intense than that of a boy, resulting, potentially, in a submissive woman of insecure personality.

**Psychologic defense** — In both sexes, defense mechanisms provide transitory resolutions of the conflict between the drives of the Id and the drives of the Ego. The first defense mechanism is repression, the blocking of memories, emotional impulses, and ideas from the conscious mind; yet it does not resolve the Id–Ego conflict. The second defense mechanism is identification, by which the child incorporates, to his or her ego, the personality characteristics of the same-sex parent; in so adapting, the boy diminishes his castration anxiety, because his likeness to father protects him from father’s wrath as a rival for mother; by so adapting, the girl facilitates identifying with mother, who understands that, in being females, neither of them possesses a penis, and thus they are not antagonists.

**Dénouement** — Unresolved psychosexual competition for the opposite-sex parent might produce a phallic-stage fixation leading a girl to become a woman who continually strives to dominate men (viz. penis envy), either as an unusually seductive woman (high self-esteem) or as an unusually submissive woman (low self-esteem). In a boy, a phallic-stage fixation might lead him to become an aggressive, over-ambitious, vain man. Therefore, the satisfactory parental handling and resolution of the Oedipus complex and of the Electra complex are most important in developing the infantile super-ego, because, by identifying with a parent, the child internalizes morality, thereby, choosing to comply with societal rules, rather than having to reflexively comply in fear of punishment.

**Latency stage**

The fourth stage of psychosexual development is the latency stage that spans from the age of six years until puberty, wherein the child consolidates the character habits he or she developed in the three, earlier stages of psychologic and sexual development. Whether or not the child has successfully resolved the Oedipal
conflict, the instinctual drives of the id are inaccessible to the Ego, because his or her defense mechanisms repressed them during the phallic stage. Hence, because said drives are latent (hidden) and gratification is delayed — unlike during the preceding oral, anal, and phallic stages — the child must derive the pleasure of gratification from secondary process-thinking that directs the libidinal drives towards external activities, such as schooling, friendships, hobbies, et cetera. Any neuroses established during the fourth, latent stage, of psychosexual development might derive from the inadequate resolution either of the Oedipus conflict or of the Ego's failure to direct his or her energies towards socially acceptable activities.

Genital stage

The fifth stage of psychosexual development is the genital stage that spans puberty and adult life, and thus occupies most of the life of a man and of a woman; its purpose is the psychologic detachment and independence from the parents. The genital stage affords the person the ability to confront and resolve his or her remaining psychosexual childhood conflicts. As in the phallic stage, the genital stage is centered upon the genitalia, but the sexuality is consensual and adult, rather than solitary and infantile. The psychological difference between the phallic and genital stages is that the ego is established in the latter; the person's concern shifts from primary-drive gratification (instinct) to applying secondary process-thinking to gratify desire symbolically and intellectually by means of friendships, a love relationship, family and adult responsibilities.

Criticism

Feminist

Contemporaneously, Sigmund Freud's psychosexual development theory is criticized as sexist, because it was informed with his introspection (self-analysis). To integrate the female libido (sexual desire) to psychosexual development, he proposed that girls develop "penis envy". In response, the German Neo-Freudian psychoanalyst Karen Horney, counter-proposed that girls instead develop "Power envy", rather than penis envy. She further proposed the concept of "womb and vagina envy", the male's envy of the female ability to bear children; yet, contemporary formulations further develop said envy from the biologic (child-bearing) to the psychologic (nurture), envy of women's perceived right to be the kind parent.

Scientific

A usual criticism of the scientific (experimental) validity of the Freudian psychology theory of human psychosexual development is that Sigmund Freud (1856–1939) was personally fixated upon human sexuality, therefore, he favored defining human
development with a normative theory of psychologic and sexual development. Hence, the phallic stage proved controversial, for being based upon clinical observations of the Oedipus complex.

In Analysis of a Phobia in a Five-year-old Boy (1909), the case study of the boy "Little Hans" (Herbert Graf, 1903-73) who was afflicted with equinophobia. The relation between Hans's fears — of horses and of father — derived from external factors, the birth of a sister, and internal factors, the desire of the infantile id to replace father as companion to mother, and guilt for enjoying the masturbation normal to a boy of his age. Moreover, his admitting to wanting to procreate with mother was considered proof of the boy's sexual attraction to the opposite-sex parent; he was a heterosexual male. Yet, the boy Hans was unable to relate fearing horses to fearing his father. The psychoanalyst Freud noted that "Hans had to be told many things that he could not say himself" and that "he had to be presented with thoughts, which he had, so far, shown no signs of possessing".

**Anthropologic**

Contemporary criticism also questions the universality of the Freudian theory of personality (Id, Ego, Super-ego) discussed in the essay On Narcissism (1917), wherein he said that "it is impossible to suppose that a unity, comparable to the ego can exist in the individual from the very start". Contemporary cultural considerations have questioned the normative presumptions of the Freudian psychodynamic perspective that posits the son—father conflict of the Oedipal complex as universal and essential to human psychologic development.

The anthropologist Bronisław Malinowski's studies of the Trobriand islanders challenged the Freudian proposal that psychosexual development (e.g. the Oedipus complex) was universal. He reported that in the insular matriarchal society of the

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Trobiand, boys are disciplined by their maternal uncles, not their fathers; impartial, avuncular discipline. In Sex and Repression in Savage Society (1927), Malinowski reported that boys dreamed of feared uncles, not of beloved fathers, thus, Power — not sexual jealousy — is the source of Oedipal conflict in such non-Western societies. In Human Behavior in Global Perspective: an Introduction to Cross-Cultural Psychology (1999), Marshall H. Segall et al. propose that Freud based the theory of psychosexual development upon a misinterpretation. Furthermore, contemporary research confirms that although personality traits corresponding to the oral stage, the anal stage, the phallic stage, the latent stage, and the genital stage are observable, they remain undetermined as fixed stages of childhood, and as adult personality traits derived from childhood. 

**Ecological Systems Theory**

Ecological Systems Theory, also called Development in Context or Human Ecology theory, specifies four types of nested environmental systems, with bi-directional influences within and between the systems.

**Overview**

Urie Bronfenbrenner is generally regarded as one of the world's leading scholars in the field of developmental psychology. His Ecological Systems Theory holds that development reflects the influence of several environmental systems, and it identifies five environmental systems:

- **Microsystem**: The setting in which the individual lives. These contexts include the person's family, peers, school, and neighborhood. It is in the micro system that the most direct interactions with social agents take place; with parents, peers, and teachers, for example. The individual is not a passive recipient of experiences in these settings, but someone who helps to construct the settings.

- **Mesosystem**: Refers to relations between microsystems or connections between contexts. Examples are the relation of family experiences to school experiences, school experiences to church experiences, and family experiences to peer experiences. For example, children whose parents have rejected them may have difficulty developing positive relations with teachers.

- **Exosystem**: Involves links between a social setting in which the individual does not have an active role and the individual's immediate context. For example, a husband's or child's experience at home may be influenced by a mother's experiences at work. The mother might receive a promotion that requires more travel, which might increase conflict with the husband and change patterns of interaction with the child.

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**Macrosystem:** Describes the culture in which individuals live. Cultural contexts include developing and industrialized countries, socioeconomic status, poverty, and ethnicity.

**Chronosystem:** The patterning of environmental events and transitions over the life course, as well as sociohistorical circumstances. For example, divorces is one transition. Researchers have found that the negative effects of divorce on children often peak in the first year after the divorce. By two years after the divorce, family interaction is less chaotic and more stable. As an example of sociohistorical circumstances, consider how the opportunities for women to pursue a career have increased during the last thirty years."

The person's own biology may be considered part of the microsystem; thus the theory has recently sometimes been called "Bio-Ecological Systems Theory."

Per this theoretical construction, each system contains roles, norms and rules which may shape psychological development. For example, an inner-city family faces many challenges which an affluent family in a gated community does not, and vice versa. The inner-city family is more likely to experience environmental hardships, such as teratogens and crime. On the other hand the sheltered family is more likely to lack the nurturing support of extended family.

Since its publication in 1979, Bronfenbrenner's major statement of this theory, The Ecology of Human Development has had widespread influence on the way psychologists and others approach the study of human beings and their environments. As a result of his groundbreaking work in "human ecology", these environments — from the family to economic and political structures — have come to be viewed as part of the life course from childhood through adulthood.

Bronfenbrenner has identified Soviet developmental psychologist Lev Vygotsky and German-born psychologist Kurt Lewin as important influences on his theory.

Bronfenbrenner's work provides one of the foundational elements of the Ecological Counseling Perspective, as espoused by Robert K. Conyne, Ellen Cook, and the University of Cincinnati Counseling Program.

There are many different theories related to human development. The ecological theory emphasizes environmental factors as playing the major role to development. This theory does in fact vary from culture to culture.
Attachment theory

An Inuit family is sitting on a log outside their tent. The parents, wearing warm clothing made of animal skins, are engaged in domestic tasks. Between them sits a toddler, also in skin clothes, staring at the camera. On the mother’s back is a baby in a papoose.

For infants and toddlers, the "set-goal" of the attachment behavioural system is to maintain or achieve proximity to attachment figures, usually the parents.

Attachment theory describes the dynamics of long-term relationships between humans. Its most important tenet is that an infant needs to develop a relationship with at least one primary caregiver for social and emotional development to occur normally. Attachment theory is an interdisciplinary study encompassing the fields of psychological, evolutionary, and ethological theory. Immediately after WWII, homeless and orphaned children presented many difficulties, and psychiatrist and psychoanalyst John Bowlby was asked by the UN to write a pamphlet on the matter. Later he went on to formulate attachment theory.

Infants become attached to adults who are sensitive and responsive in social interactions with them, and who remain as consistent caregivers for some months during the period from about six months to two years of age. When an infant begins to crawl and walk they begin to use attachment figures (familiar people) as a secure base to explore from and return to. Parental responses lead to the development of patterns of attachment; these, in turn, lead to internal working models which will

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guide the individual's perceptions, emotions, thoughts and expectations in later relationships. Separation anxiety or grief following the loss of an attachment figure is considered to be a normal and adaptive response for an attached infant. These behaviours may have evolved because they increase the probability of survival of the child.

Infant behaviour associated with attachment is primarily the seeking of proximity to an attachment figure. To formulate a comprehensive theory of the nature of early attachments, Bowlby explored a range of fields, including evolutionary biology, object relations theory (a branch of psychoanalysis), control systems theory, and the fields of ethology and cognitive psychology. After preliminary papers from 1958 onwards, Bowlby published a complete study in 3 volumes Attachment and Loss (1969–82).

Research by developmental psychologist Mary Ainsworth in the 1960s and 70s reinforced the basic concepts, introduced the concept of the "secure base" and developed a theory of a number of attachment patterns in infants: secure attachment, avoidant attachment and anxious attachment. A fourth pattern, disorganized attachment, was identified later.

In the 1980s, the theory was extended to attachment in adults. Other interactions may be construed as including components of attachment behaviour; these include peer relationships at all ages, romantic and sexual attraction and responses to the care needs of infants or the sick and elderly.

In the early days of the theory, academic psychologists criticized Bowlby, and the psychoanalytic community ostracised him for his departure from psychoanalytical tenets; however, attachment theory has since become "the dominant approach to understanding early social development, and has given rise to a great surge of empirical research into the formation of children's close relationships". Later criticisms of attachment theory relate to temperament, the complexity of social relationships, and the limitations of discrete patterns for classifications. Attachment theory has been significantly modified as a result of empirical research, but the concepts have become generally accepted. Attachment theory has formed the basis of new therapies and informed existing ones, and its concepts have been used in the formulation of social and childcare policies to support the early attachment relationships of children.
A young mother smiles up at the camera. On her back is her baby gazing at the camera with an expression of lively interest.

Although it is usual for the mother to be the primary attachment figure, infants will form attachments to any caregiver who is sensitive and responsive in social interactions with them.

Within attachment theory, attachment means an affectional bond or tie between an individual and an attachment figure (usually a caregiver). Such bonds may be reciprocal between two adults, but between a child and a caregiver these bonds are based on the child’s need for safety, security and protection, paramount in infancy and childhood. The theory proposes that children attach to carers instinctively, for the purpose of survival and, ultimately, genetic replication. The biological aim is survival and the psychological aim is security. Attachment theory is not an exhaustive description of human relationships, nor is it synonymous with love and affection, although these may indicate that bonds exist. In child-to-adult
relationships, the child's tie is called the "attachment" and the caregiver's reciprocal equivalent is referred to as the "care-giving bond".

Infants form attachments to any consistent caregiver who is sensitive and responsive in social interactions with them. The quality of the social engagement is more influential than the amount of time spent. The biological mother is the usual principal attachment figure, but the role can be taken by anyone who consistently behaves in a "mothering" way over a period of time. In attachment theory, this means a set of behaviours that involves engaging in lively social interaction with the infant and responding readily to signals and approaches. Nothing in the theory suggests that fathers are not equally likely to become principal attachment figures if they provide most of the child care and related social interaction.

Some infants direct attachment behaviour (proximity seeking) towards more than one attachment figure almost as soon as they start to show discrimination between caregivers; most come to do so during their second year. These figures are arranged hierarchically, with the principal attachment figure at the top. The set-goal of the attachment behavioural system is to maintain a bond with an accessible and available attachment figure. "Alarm" is the term used for activation of the attachment behavioural system caused by fear of danger. "Anxiety" is the anticipation or fear of being cut off from the attachment figure. If the figure is unavailable or unresponsive, separation distress occurs. In infants, physical separation can cause anxiety and anger, followed by sadness and despair. By age three or four, physical separation is no longer such a threat to the child's bond with the attachment figure. Threats to security in older children and adults arise from prolonged absence, breakdowns in communication, emotional unavailability or signs of rejection or abandonment.

**Behaviours**

A baby leans at a table staring at a picture book with intense concentration. Insecure attachment patterns can compromise exploration and the achievement of self-confidence. A securely attached baby is free to concentrate on her or his environment.

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The attachment behavioural system serves to maintain or achieve closer proximity to the attachment figure. Pre-attachment behaviours occur in the first six months of life. During the first phase (the first eight weeks), infants smile, babble and cry to attract the attention of caregivers. Although infants of this age learn to discriminate between caregivers, these behaviours are directed at anyone in the vicinity. During the second phase (two to six months), the infant increasingly discriminates between familiar and unfamiliar adults, becoming more responsive towards the caregiver; following and clinging are added to the range of behaviours. Clear-cut attachment develops in the third phase, between the ages of six months and two years. The infant’s behaviour towards the caregiver becomes organised on a goal-directed basis to achieve the conditions that make it feel secure. By the end of the first year, the infant is able to display a range of attachment behaviours designed to maintain proximity. These manifest as protesting the caregiver’s departure, greeting the caregiver’s return, clinging when frightened and following when able. With the development of locomotion, the infant begins to use the caregiver or caregivers as a safe base from which to explore. Infant exploration is greater when the caregiver is present because the infant’s attachment system is relaxed and it is free to explore. If the caregiver is inaccessible or unresponsive, attachment behaviour is more strongly exhibited. Anxiety, fear, illness and fatigue will cause a child to increase attachment behaviours. After the second year, as the child begins to see the carer as an independent person, a more complex and goal-corrected partnership is formed. Children begin to notice others’ goals and feelings and plan their actions accordingly. For example, whereas babies cry because of pain, two-year-olds cry to summon their caregiver, and if that does not work, cry louder, shout or follow.

Tenets

Common human attachment behaviours and emotions are adaptive. Human evolution has involved selection for social behaviours that make individual or group survival more likely. The commonly observed attachment behaviour of toddlers staying near familiar people would have had safety advantages in the environment of early adaptation, and has such advantages today. Bowlby saw the environment of early adaptation as similar to current hunter-gatherer societies. There is a survival advantage in the capacity to sense possibly dangerous conditions such as unfamiliarity, being alone or rapid approach. According to Bowlby, proximity-seeking to the attachment figure in the face of threat is the "set-goal" of the attachment behavioural system.

The attachment system is very robust and young humans form attachments easily, even in far less than ideal circumstances. In spite of this robustness, significant separation from a familiar caregiver—or frequent changes of caregiver that prevent the development of attachment—may result in psychopathology at some point in later life. Infants in their first months have no preference for their biological parents over strangers. Preferences for certain people, plus behaviours which solicit their

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attention and care, are developed over a considerable period of time. When an infant is upset by separation from their caregiver, this indicates that the bond no longer depends on the presence of the caregiver, but is of an enduring nature. A young father lies on his back on a quilt on the floor. He holds his baby daughter up above him with his arms straight and his hands round her ribcage. The baby has her arms and legs stretched out and arches her back smiling directly at the camera.

Early experiences with caregivers gradually give rise to a system of thoughts, memories, beliefs, expectations, emotions and behaviours about the self and others.

Bowlby’s original sensitivity period of between six months and two to three years has been modified to a less "all or nothing" approach. There is a sensitive period during which it is highly desirable that selective attachments develop, but the time frame is broader and the effect less fixed and irreversible than first proposed. With further research, authors discussing attachment theory have come to appreciate that social development is affected by later as well as earlier relationships. Early steps in attachment take place most easily if the infant has one caregiver, or the occasional care of a small number of other people. According to Bowlby, almost from the first many children have more than one figure towards whom they direct attachment behaviour. These figures are not treated alike; there is a strong bias for a child to direct attachment behaviour mainly towards one particular person. Bowlby

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used the term "monotropy" to describe this bias. Researchers and theorists have abandoned this concept insofar as it may be taken to mean that the relationship with the special figure differs qualitatively from that of other figures. Rather, current thinking postulates definite hierarchies of relationships.

Early experiences with caregivers gradually give rise to a system of thoughts, memories, beliefs, expectations, emotions, and behaviours about the self and others. This system, called the "internal working model of social relationships", continues to develop with time and experience. Internal models regulate, interpret and predict attachment-related behaviour in the self and the attachment figure. As they develop in line with environmental and developmental changes, they incorporate the capacity to reflect and communicate about past and future attachment relationships. They enable the child to handle new types of social interactions; knowing, for example, that an infant should be treated differently from an older child, or that interactions with teachers and parents share characteristics. This internal working model continues to develop through adulthood, helping cope with friendships, marriage and parenthood, all of which involve different behaviours and feelings. The development of attachment is a transactional process. Specific attachment behaviours begin with predictable, apparently innate, behaviours in infancy. They change with age in ways that are determined partly by experiences and partly by situational factors. As attachment behaviours change with age, they do so in ways shaped by relationships. A child's behaviour when reunited with a caregiver is determined not only by how the caregiver has treated the child before, but on the history of effects the child has had on the caregiver.

Changes in attachment during childhood and adolescence

Age, cognitive growth and continued social experience advance the development and complexity of the internal working model. Attachment-related behaviours lose some characteristics typical of the infant-toddler period and take on age-related tendencies. The preschool period involves the use of negotiation and bargaining. For example, four-year-olds are not distressed by separation if they and their caregiver have already negotiated a shared plan for the separation and reunion.

Three children aged about six years are in a group on the ground, a boy and girl kneeling and another boy seated cross-legged. The two kneeling children hold marbles. There are other marbles in a bag on the ground. They appear to be negotiating over the marbles. The third child is watching.
Peers become important in middle childhood and have an influence distinct from that of parents. Ideally, these social skills become incorporated into the internal working model to be used with other children and later with adult peers. As children move into the school years at about six years old, most develop a goal-corrected partnership with parents, in which each partner is willing to compromise in order to maintain a gratifying relationship. By middle childhood, the goal of the attachment behavioural system has changed from proximity to the attachment figure to availability. Generally, a child is content with longer separations, provided contact—or the possibility of physically reuniting, if needed—is available. Attachment behaviours such as clinging and following decline and self-reliance increases. By middle childhood (ages 7–11), there may be a shift towards mutual coregulation of secure-base contact in which caregiver and child negotiate methods of maintaining communication and supervision as the child moves towards a greater degree of independence.

In early childhood, parental figures remain the centre of a child’s social world, even if they spend substantial periods of time in alternative care. This gradually lessens, particularly during the child’s entrance into formal schooling. The attachment models of young children are typically assessed in relation to particular figures, such as parents or other caregivers. There appear to be limitations in their thinking that restrict their ability to integrate relationship experiences into a single general model. Children usually begin to develop a single general model of attachment relationships during adolescence, although this may occur in middle childhood.

Relationships with peers have an influence on the child that is distinct from that of parent-child relationships, though the latter can influence the peer relationships children form. Although peers become important in middle childhood, the evidence suggests peers do not become attachment figures, though children may direct

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attachment behaviours at peers if parental figures are unavailable. Attachments to peers tend to emerge in adolescence, although parents continue to be attachment figures. With adolescents, the role of the parental figures is to be available when needed while the adolescent makes excursions into the outside world.

**Attachment patterns**

Much of attachment theory was informed by Mary Ainsworth’s innovative methodology and observational studies, particularly those undertaken in Scotland and Uganda. Ainsworth’s work expanded the theory’s concepts and enabled empirical testing of its tenets. Using Bowlby’s early formulation, she conducted observational research on infant-parent pairs (or dyads) during the child’s first year, combining extensive home visits with the study of behaviours in particular situations. This early research was published in 1967 in a book titled Infancy in Uganda. Ainsworth identified three attachment styles, or patterns, that a child may have with attachment figures: secure, anxious-avoidant (insecure) and anxious-ambivalent or resistant (insecure). She devised a procedure known as the Strange Situation Protocol as the laboratory portion of her larger study, to assess separation and reunion behaviour. This is a standardised research tool used to assess attachment patterns in infants and toddlers. By creating stresses designed to activate attachment behaviour, the procedure reveals how very young children use their caregiver as a source of security. Carer and child are placed in an unfamiliar playroom while a researcher records specific behaviours, observing through a one-way mirror. In eight different episodes, the child experiences separation from/reunion with the carer and the presence of an unfamiliar stranger.

Ainsworth’s work in the United States attracted many scholars into the field, inspiring research and challenging the dominance of behaviourism. Further research by Mary Main and colleagues at the University of California, Berkeley identified a fourth attachment pattern, called disorganized/disoriented attachment. The name reflects these children’s lack of a coherent coping strategy.

The type of attachment developed by infants depends on the quality of care they have received. Each of the attachment patterns is associated with certain characteristic patterns of behaviour, as described in the following table:

<table>
<thead>
<tr>
<th>Child and caregiver behaviour patterns before the age of 18 months</th>
<th>Attachment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Secure</strong></td>
<td></td>
</tr>
<tr>
<td>- Uses caregiver as a secure base for exploration. Protests caregiver’s departure and seeks proximity and is comforted on return, returning to exploration. May be comforted by the stranger but shows clear preference for the caregiver.</td>
<td></td>
</tr>
</tbody>
</table>

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- Responds appropriately, promptly and consistently to needs. Caregiver has successfully formed a secure parental attachment bond to the child.

Avoidant

- Little affective sharing in play. Little or no distress on departure, little or no visible response to return, ignoring or turning away with no effort to maintain contact if picked up. Treats the stranger similarly to the caregiver. The child feels that there is no attachment; therefore, the child is rebellious and has a lower self-image and self-esteem.
- Little or no response to distressed child. Discourages crying and encourages independence.

Ambivalent/Resistant

- Unable to use caregiver as a secure base, seeking proximity before separation occurs. Distressed on separation with ambivalence, anger, reluctance to warm to caregiver and return to play on return. Preoccupied with caregiver’s availability, seeking contact but resisting angrily when it is achieved. Not easily calmed by stranger. In this relationship, the child always feels anxious because the caregiver’s availability is never consistent.
- Inconsistent between appropriate and neglectful responses. Generally will only respond after increased attachment behavior from the infant.

Disorganized

- Stereotypies on return such as freezing or rocking. Lack of coherent attachment strategy shown by contradictory, disorientated behaviours such as approaching but with the back turned.
- Frightened or frightening behaviour, intrusiveness, withdrawal, negativity, role confusion, affective communication errors and maltreatment. Very often associated with many forms of abuse towards the child.

The presence of an attachment is distinct from its quality. Infants form attachments if there is someone to interact with, even if mistreated. Individual differences in the relationships reflect the history of care, as infants begin to predict the behaviour of caregivers through repeated interactions. The focus is the organisation (pattern) rather than quantity of attachment behaviours. Insecure attachment patterns are non-optimal as they can compromise exploration, self-confidence and mastery of the environment. However, insecure patterns are also adaptive, as they are suitable responses to caregiver unresponsiveness. For example, in the avoidant pattern, minimising expressions of attachment even in conditions of mild threat may
foremast alienating caregivers who are already rejecting, thus leaving open the possibility of responsiveness should a more serious threat arise.

Around 65% of children in the general population may be classified as having a secure pattern of attachment, with the remaining 35% being divided between the insecure classifications. Recent research has sought to ascertain the extent to which a parent’s attachment classification is predictive of their children’s classification. Parents’ perceptions of their own childhood attachments were found to predict their children’s classifications 75% of the time.

Over the short term, the stability of attachment classifications is high, but becomes less so over the long term. It appears that stability of classification is linked to stability in caregiving conditions. Social stressors or negative life events—such as illness, death, abuse or divorce—are associated with instability of attachment patterns from infancy to early adulthood, particularly from secure to insecure. Conversely, these difficulties sometimes reflect particular upheavals in people’s lives, which may change. Sometimes, parents’ responses change as the child develops, changing classification from insecure to secure. Fundamental changes can and do take place after the critical early period. Physically abused and neglected children are less likely to develop secure attachments, and their insecure classifications tend to persist through the pre-school years. Neglect alone is associated with insecure attachment organisations, and rates of disorganized attachment are markedly elevated in maltreated infants.

This situation is complicated by difficulties in assessing attachment classification in older age groups. The Strange Situation procedure is for ages 12 to 18 months only; adapted versions exist for pre-school children. Techniques have been developed to allow verbal ascertainment of the child’s state of mind with respect to attachment. An example is the “stem story”, in which a child is given the beginning of a story that raises attachment issues and asked to complete it. For older children, adolescents and adults, semi-structured interviews are used in which the manner of relaying content may be as significant as the content itself. However, there are no substantially validated measures of attachment for middle childhood or early adolescence (approximately 7 to 13 years of age).

Some authors have questioned the idea that a taxonomy of categories representing a qualitative difference in attachment relationships can be developed. Examination of data from 1,139 15-month-olds showed that variation in attachment patterns was continuous rather than grouped. This criticism introduces important questions for attachment typologies and the mechanisms behind apparent types. However, it has relatively little relevance for attachment theory itself, which "neither requires nor predicts discrete patterns of attachment".
Significance of attachment patterns

There is an extensive body of research demonstrating a significant association between attachment organisations and children’s functioning across multiple domains. Early insecure attachment does not necessarily predict difficulties, but it is a liability for the child, particularly if similar parental behaviours continue throughout childhood. Compared to that of securely attached children, the adjustment of insecure children in many spheres of life is not as soundly based, putting their future relationships in jeopardy. Although the link is not fully established by research and there are other influences besides attachment, secure infants are more likely to become socially competent than their insecure peers. Relationships formed with peers influence the acquisition of social skills, intellectual development and the formation of social identity. Classification of children’s peer status (popular, neglected or rejected) has been found to predict subsequent adjustment. Insecure children, particularly avoidant children, are especially vulnerable to family risk. Their social and behavioural problems increase or decline with deterioration or improvement in parenting. However, an early secure attachment appears to have a lasting protective function. As with attachment to parental figures, subsequent experiences may alter the course of development.

The most concerning pattern is disorganized attachment. About 80% of maltreated infants are likely to be classified as disorganized, as opposed to about 12% found in non-maltreated samples. Only about 15% of maltreated infants are likely to be classified as secure. Children with a disorganized pattern in infancy tend to show markedly disturbed patterns of relationships. Subsequently their relationships with peers can often be characterised by a “fight or flight” pattern of alternate aggression and withdrawal. Affected maltreated children are also more likely to become maltreating parents. A minority of maltreated children do not, instead achieving secure attachments, good relationships with peers and non-abusive parenting styles. The link between insecure attachment, particularly the disorganized classification, and the emergence of childhood psychopathology is well-established, although it is a non-specific risk factor for future problems, not a pathology or a direct cause of pathology in itself. In the classroom, it appears that ambivalent children are at an elevated risk for internalising disorders, and avoidant and disorganized children, for externalising disorders.

One explanation for the effects of early attachment classifications may lie in the internal working model mechanism. Internal models are not just "pictures" but refer to the feelings aroused. They enable a person to anticipate and interpret another's behaviour and plan a response. If an infant experiences their caregiver as a source of security and support, they are more likely to develop a positive self-image and expect positive reactions from others. Conversely, a child from an abusive relationship with the caregiver may internalise a negative self-image and generalise negative expectations into other relationships. The internal working models on
which attachment behaviour is based show a degree of continuity and stability. Children are likely to fall into the same categories as their primary caregivers indicating that the caregivers’ internal working models affect the way they relate to their child. This effect has been observed to continue across three generations. Bowlby believed that the earliest models formed were the most likely to persist because they existed in the subconscious. Such models are not, however, impervious to change given further relationship experiences; a minority of children have different attachment classifications with different caregivers.

There is some evidence that gender differences in attachment patterns of adaptive significance begin to emerge in middle childhood. Insecure attachment and early psychosocial stress indicate the presence of environmental risk (for example poverty, mental illness, instability, minority status, violence). This can tend to favour the development of strategies for earlier reproduction. However, different patterns have different adaptive values for males and females. Insecure males tend to adopt avoidant strategies, whereas insecure females tend to adopt anxious/ambivalent strategies, unless they are in a very high risk environment. Adrenarche is proposed as the endocrine mechanism underlying the reorganisation of insecure attachment in middle childhood.

Attachment in adults

Attachment theory was extended to adult romantic relationships in the late 1980s by Cindy Hazan and Phillip Shaver. Four styles of attachment have been identified in adults: secure, anxious-preoccupied, dismissive-avoidant and fearful-avoidant. These roughly correspond to infant classifications: secure, insecure-ambivalent, insecure-avoidant and disorganized/disoriented.

Securely attached adults tend to have positive views of themselves, their partners and their relationships. They feel comfortable with intimacy and independence, balancing the two. Anxious-preoccupied adults seek high levels of intimacy, approval and responsiveness from partners, becoming overly dependent. They tend to be less trusting, have less positive views about themselves and their partners, and may exhibit high levels of emotional expressiveness, worry and impulsiveness in their relationships. Dismissive-avoidant adults desire a high level of independence, often appearing to avoid attachment altogether. They view themselves as self-sufficient, invulnerable to attachment feelings and not needing close relationships. They tend to suppress their feelings, dealing with rejection by distancing themselves from partners of whom they often have a poor opinion. Fearful-avoidant adults have mixed feelings about close relationships, both desiring and feeling uncomfortable with emotional closeness. They tend to mistrust their partners and view themselves as unworthy. Like dismissive-avoidant adults, fearful-avoidant adults tend to seek less intimacy, suppressing their feelings.
Attachment styles in adult romantic relationships roughly correspond to attachment styles in infants but adults can hold different internal working models for different relationships.

Two main aspects of adult attachment have been studied. The organisation and stability of the mental working models that underlie the attachment styles is explored by social psychologists interested in romantic attachment. Developmental psychologists interested in the individual’s state of mind with respect to attachment generally explore how attachment functions in relationship dynamics and impacts relationship outcomes. The organisation of mental working models is more stable while the individual’s state of mind with respect to attachment fluctuates more. Some authors have suggested that adults do not hold a single set of working models. Instead, on one level they have a set of rules and assumptions about attachment relationships in general. On another level they hold information about specific relationships or relationship events. Information at different levels need not be consistent. Individuals can therefore hold different internal working models for different relationships.

There are a number of different measures of adult attachment, the most common being self-report questionnaires and coded interviews based on the Adult Attachment Interview. The various measures were developed primarily as research tools, for different purposes and addressing different domains, for example romantic relationships, parental relationships or peer relationships. Some classify an adult's state of mind with respect to attachment and attachment patterns by reference to childhood experiences, while others assess relationship behaviours and security regarding parents and peers.

**History**

**Earlier theories**

The concept of infants' emotional attachment to caregivers has been known anecdotally for hundreds of years. From the late 19th century onward, psychologists and psychiatrists suggested theories about the existence or nature of early relationships. Early Freudian theory had little to say about a child's relationship with the mother, postulating only that the breast was the love object. Freudians attributed the infant’s attempts to stay near the familiar person to motivation learned through feeding and gratification of libidinal drives. In the 1930s, British developmental psychologist Ian Suttie suggested that the child’s need for affection was a primary one, not based on hunger or other physical gratifications. William Blatz, a Canadian psychologist and teacher of Mary Ainsworth, also stressed the importance of social relationships for development. Blatz proposed that the need for security was a normal part of personality, as was the use of others as a secure base.
Observers from the 1940s onward focused on anxiety displayed by infants and toddlers threatened with separation from a familiar caregiver.

Another theory prevalent at the time of Bowlby’s development of attachment theory was "dependency". This proposed that infants were dependent on adult caregivers but outgrew it in the course of early childhood; attachment behaviour in older children would thus be seen as regressive. Attachment theory assumes older children and adults retain attachment behaviour, displaying it in stressful situations. Indeed, a secure attachment is associated with independent exploratory behaviour rather than dependence. Bowlby developed attachment theory as a consequence of his dissatisfaction with existing theories of early relationships.

**Maternal deprivation**

The early thinking of the object relations school of psychoanalysis, particularly Melanie Klein, influenced Bowlby. However, he profoundly disagreed with the prevalent psychoanalytic belief that infants’ responses relate to their internal fantasy life rather than real-life events. As Bowlby formulated his concepts, he was influenced by case studies on disturbed and delinquent children, such as those of William Goldfarb published in 1943 and 1945.

Two rows of little boys, about 20 in total, kneel before their beds in the dormitory of a residential nursery. Their eyes are shut and they are in an attitude of prayer. They wear long white night gowns and behind them are their iron framed beds.


Bowlby’s contemporary René Spitz observed separated children’s grief, proposing that "psychotoxic" results were brought about by inappropriate experiences of early care. A strong influence was the work of social worker and psychoanalyst James Robertson who filmed the effects of separation on children in hospital. He and Bowlby collaborated in making the 1952 documentary film A Two-Year Old Goes to

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the Hospital which was instrumental in a campaign to alter hospital restrictions on visits by parents.

In his 1951 monograph for the World Health Organisation, Maternal Care and Mental Health, Bowlby put forward the hypothesis that "the infant and young child should experience a warm, intimate, and continuous relationship with his mother (or permanent mother substitute) in which both find satisfaction and enjoyment", the lack of which may have significant and irreversible mental health consequences. This was also published as Child Care and the Growth of Love for public consumption. The central proposition was influential but highly controversial. At the time there was limited empirical data and no comprehensive theory to account for such a conclusion. Nevertheless, Bowlby's theory sparked considerable interest in the nature of early relationships, giving a strong impetus to, (in the words of Mary Ainsworth), a "great body of research" in an extremely difficult, complex area. Bowlby's work (and Robertson's films) caused a virtual revolution in hospital visiting by parents, hospital provision for children's play, educational and social needs and the use of residential nurseries. Over time, orphanages were abandoned in favour of foster care or family-style homes in most developed countries.

Formulation of the theory

Following the publication of Maternal Care and Mental Health, Bowlby sought new understanding from the fields of evolutionary biology, ethology, developmental psychology, cognitive science and control systems theory. He formulated the innovative proposition that mechanisms underlying an infant's emotional tie to the caregiver(s) emerged as a result of evolutionary pressure. He set out to develop a theory of motivation and behaviour control built on science rather than Freud's psychic energy model. Bowlby argued that with attachment theory he had made good the "deficiencies of the data and the lack of theory to link alleged cause and effect" of Maternal Care and Mental Health.

A young mother kneels in a garden with her two children. A baby sits astride her knee facing outwards and looking away from the camera. A toddler stands slightly in front of his mother holding a spade and frowning at the camera.

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Infant exploration is greater when the caregiver is present; with the caregiver present, the infant’s attachment system is relaxed and he is free to explore.

The formal origin of the theory began with the publication of two papers in 1958, the first being Bowlby’s "The Nature of the Child’s Tie to his Mother", in which the precursory concepts of "attachment" were introduced. The second was Harry Harlow's "The Nature of Love". The latter was based on experiments which showed that infant rhesus monkeys appeared to form an affectional bond with soft, cloth surrogate mothers that offered no food but not with wire surrogate mothers that provided a food source but were less pleasant to touch. Bowlby followed up his first paper with two more; "Separation Anxiety" (1960a), and "Grief and Mourning in Infancy and Early Childhood" (1960b). At the same time, Bowlby’s colleague Mary Ainsworth, with Bowlby’s ethological theories in mind, was completing her extensive observational studies on the nature of infant attachments in Uganda. Attachment theory was finally presented in 1969 in Attachment, the first volume of the Attachment and Loss trilogy. The second and third volumes, Separation: Anxiety and Anger and Loss: Sadness and Depression followed in 1972 and 1980 respectively. Attachment was revised in 1982 to incorporate later research.

Attachment theory came at a time when women were asserting their right to equality and independence, giving mothers new cause for anxiety. Attachment theory itself is not gender specific but in Western society it was largely mothers who bore responsibility for early child care. Thus lack of proper nurturing of children was blamed on mothers despite societal organisation that left them overburdened. Opposition to attachment theory coalesced around this issue. Feminists had already criticised the assumption that anatomy is destiny which they saw as implicit in the maternal deprivation hypothesis.

**Ethology**

Bowlby’s attention was first drawn to ethology when he read Konrad Lorenz’s 1952 publication in draft form (although Lorenz had published earlier work). Other important influences were ethologists Nikolaas Tinbergen and Robert Hinde. Bowlby subsequently collaborated with Hinde. In 1953 Bowlby stated "the time is ripe for a unification of psychoanalytic concepts with those of ethology, and to pursue the rich vein of research which this union suggests". Konrad Lorenz had examined the phenomenon of "imprinting", a behaviour characteristic of some birds and mammals which involves rapid learning of recognition by the young, of a conspecific or comparable object. After recognition comes a tendency to follow. A young woman in rubber boots is walking through a muddy clearing in a wood at Kostroma Moose Farm followed by a very young moose, struggling to keep up
The learning is possible only within a limited age range known as a critical period. Bowlby’s concepts included the idea that attachment involved learning from experience during a limited age period, influenced by adult behaviour. He did not apply the imprinting concept in its entirety to human attachment. However, he considered that attachment behaviour was best explained as instinctive, combined with the effect of experience, stressing the readiness the child brings to social interactions. Over time it became apparent there were more differences than similarities between attachment theory and imprinting so the analogy was dropped.

Ethologists expressed concern about the adequacy of some research on which attachment theory was based, particularly the generalisation to humans from animal studies. Schur, discussing Bowlby’s use of ethological concepts (pre-1960) commented that concepts used in attachment theory had not kept up with changes in ethology itself. Ethologists and others writing in the 1960s and 1970s questioned and expanded the types of behaviour used as indications of attachment. Observational studies of young children in natural settings provided other behaviours that might indicate attachment; for example, staying within a predictable distance of the mother without effort on her part and picking up small objects, bringing them to the mother but not to others. Although ethologists tended to be in agreement with Bowlby, they pressed for more data, objecting to psychologists writing as if there was an "entity which is 'attachment', existing over and above the observable measures." Robert Hinde considered "attachment behaviour system" to be an appropriate term which did not offer the same problems "because it refers to postulated control systems that determine the relations between different kinds of behaviour."

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Psychoanalysis

Several lines of school children march diagonally from top right to bottom left. Each carries a bag or bundle and each raises their right arm in the air in a salute. Adults stand in a line across the bottom right hand corner making the same gesture.

Evacuation of smiling Japanese school children in World War II from the book Road to Catastrophe

Psychoanalytic concepts influenced Bowlby's view of attachment, in particular, the observations by Anna Freud and Dorothy Burlingham of young children separated from familiar caregivers during World War II. However, Bowlby rejected psychoanalytical explanations for early infant bonds including "drive theory" in which the motivation for attachment derives from gratification of hunger and libidinal drives. He called this the "cupboard-love" theory of relationships. In his view it failed to see attachment as a psychological bond in its own right rather than an instinct derived from feeding or sexuality. Based on ideas of primary attachment and neo-Darwinism, Bowlby identified what he saw as fundamental flaws in psychoanalysis. Firstly the overemphasis of internal dangers rather than external threat. Secondly the view of the development of personality via linear "phases" with "regression" to fixed points accounting for psychological distress. Instead he posited that several lines of development were possible, the outcome of which depended on the interaction between the organism and the environment. In attachment this would mean that although a developing child has a propensity to form attachments,
the nature of those attachments depends on the environment to which the child is exposed.

From early in the development of attachment theory there was criticism of the theory’s lack of congruence with various branches of psychoanalysis. Bowlby’s decisions left him open to criticism from well-established thinkers working on similar problems. Bowlby was effectively ostracized from the psychoanalytic community.

**Internal working model**

Bowlby adopted the important concept of the internal working model of social relationships from the work of the philosopher Kenneth Craik. Craik had noted the adaptiveness of the ability of thought to predict events. He stressed the survival value of and natural selection for this ability. According to Craik, prediction occurs when a "small-scale model" consisting of brain events is used to represent not only the external environment, but the individual’s own possible actions. This model allows a person to try out alternatives mentally, using knowledge of the past in responding to the present and future. At about the same time Bowlby was applying Craik’s ideas to attachment, other psychologists were applying these concepts to adult perception and cognition.

**Cybernetics**

The theory of visible systems (cybernetics), developing during the 1930s and ‘40s, influenced Bowlby’s thinking. The young child’s need for proximity to the attachment figure was seen as balancing homeostatically with the need for exploration. (Bowlby compared this process to physiological homeostasis whereby, for example, blood pressure is kept within limits). The actual distance maintained by the child would vary as the balance of needs changed. For example, the approach of a stranger, or an injury, would cause the child exploring at a distance to seek proximity. The child’s goal is not an object (the caregiver) but a state; maintenance of the desired distance from the caregiver depending on circumstances.

**Cognitive development**

Bowlby’s reliance on Piaget’s theory of cognitive development gave rise to questions about object permanence (the ability to remember an object that is temporarily absent) in early attachment behaviours. An infant’s ability to discriminate strangers and react to the mother’s absence seemed to occur months earlier than Piaget suggested would be cognitively possible. More recently, it has been noted that the understanding of mental representation has advanced so much since Bowlby’s day that present views can be more specific than those of Bowlby’s time.
Behaviourism

In 1969, Gerwitz discussed how mother and child could provide each other with positive reinforcement experiences through their mutual attention, thereby learning to stay close together. This explanation would make it unnecessary to posit innate human characteristics fostering attachment. Learning theory, (behaviorism), saw attachment as a remnant of dependency with the quality of attachment being merely a response to the caregiver's cues. Behaviourists saw behaviours like crying as a random activity meaning nothing until reinforced by a caregiver's response. To behaviourists, frequent responses would result in more crying. To attachment theorists, crying is an inborn attachment behaviour to which the caregiver must respond if the infant is to develop emotional security. Conscientious responses produce security which enhances autonomy and results in less crying. Ainsworth's research in Baltimore supported the attachment theorists' view.

Behaviourists generally disagree with this interpretation. Though they use a different analysis scale, they maintain that behaviours like separation protest in infants result mainly from operant learning experiences. When a mother is instructed to ignore crying and respond only to play behaviour, the baby ceases to protest and engages in play behaviour. The "separation anxiety" resulting from such interactions is seen as learned behaviour, resulting from misplaced contingencies. Such misplaced contingencies may represent the ambivalence on the part of the parent, which is then is played out in the operant interaction. Behaviourists see attachment more as a systems phenomena then a biological predisposition. Patterson's group has shown that in uncertain environments the lack of contingent relationships can account for problems in attachment and the sensitivity to contingencies. In the last decade, behaviour analysts have constructed models of attachment based on the importance of contingent relationships. These behaviour analytic models have received some support from research, and meta-analytic reviews.

Developments

As the formulation of attachment theory progressed, there was criticism of the empirical support for the theory. Possible alternative explanations for results of empirical research were proposed. Some of Bowlby's interpretations of James Robertson's data were rejected by the researcher when he reported data from 13 young children cared for in ideal rather than institutional circumstances on separation from their mothers. In the second volume of the trilogy, Separation, Bowlby acknowledged Robertson's study had caused him to modify his views on the traumatic consequences of separation in which insufficient weight had been given to the influence of skilled care from a familiar substitute. In 1984 Skuse based criticism on the work of Anna Freud with children from Theresienstadt who had apparently developed relatively normally despite serious deprivation in their early years. He
concluded there was an excellent prognosis for children with this background, unless there were biological or genetic risk factors.

Bowlby’s arguments that even very young babies were social creatures and primary actors in creating relationships with parents took some time to be accepted. So did Ainsworth’s emphasis on the importance and primacy of maternal attunement for psychological development (a point also argued by Donald Winnicott). In the 1970s Daniel Stern undertook research on the concept of attunement between very young infants and caregivers, using micro-analysis of video evidence. This added significantly to the understanding of the complexity of infant/caregiver interactions as an integral part of a baby’s emotional and social development.

In the 1970s, problems with viewing attachment as a trait (stable characteristic of an individual) rather than as a type of behaviour with organising functions and outcomes, led some authors to the conclusion that attachment behaviours were best understood in terms of their functions in the child’s life. This way of thinking saw the secure base concept as central to attachment theory’s, logic, coherence and status as an organizational construct. Following this argument, the assumption that attachment is expressed identically in all humans cross-culturally was examined. The research showed that though there were cultural differences, the three basic patterns, secure, avoidant and ambivalent, can be found in every culture in which studies have been undertaken, even where communal sleeping arrangements are the norm.

On the right a young boy of asiatic appearance with a pudding basin haircut, leans over a baby lying on its back on the left. The boy and baby are touching noses. The baby gazes up at the boy with an expression of intense interest. Research indicates that attachment pattern distributions are consistent across cultures, although the manner in which attachment is expressed may differ.
Selection of the secure pattern is found in the majority of children across cultures studied. This follows logically from the fact that attachment theory provides for infants to adapt to changes in the environment, selecting optimal behavioural strategies. How attachment is expressed shows cultural variations which need to be ascertained before studies can be undertaken; for example Gusii infants are greeted with a handshake rather than a hug. Securely attached Gusii infants anticipate and seek this contact. There are also differences in the distribution of insecure patterns based on cultural differences in child-rearing practices.

The biggest challenge to the notion of the universality of attachment theory came from studies conducted in Japan where the concept of amae plays a prominent role in describing family relationships. Arguments revolved around the appropriateness of the use of the Strange Situation procedure where amae is practiced. Ultimately research tended to confirm the universality hypothesis of attachment theory. Most recently a 2007 study conducted in Sapporo in Japan found attachment distributions consistent with global norms using the six-year Main and Cassidy scoring system for attachment classification.

Critics in the 1990s such as J. R. Harris, Steven Pinker and Jerome Kagan were generally concerned with the concept of infant determinism (nature versus nurture), stressing the effects of later experience on personality. Building on the work on temperament of Stella Chess, Kagan rejected almost every assumption on which attachment theory etiology was based. He argued that heredity was far more important than the transient effects of early environment. For example a child with an inherently difficult temperament would not elicit sensitive behavioural responses from a caregiver. The debate spawned considerable research and analysis of data from the growing number of longitudinal studies. Subsequent research has not borne out Kagan's argument, broadly demonstrating that it is the caregiver's behaviours that form the child's attachment style, although how this style is expressed may differ with temperament. Harris and Pinker put forward the notion that the influence of parents had been much exaggerated, arguing that socialisation took place primarily in peer groups. H. Rudolph Schaffer concluded that parents and peers had different functions, fulfilling distinctive roles in children's development.

Recent developments

Whereas Bowlby was inspired by Piaget's insights into children's thinking, current attachment scholars utilise insights from contemporary literature on implicit knowledge, theory of mind, autobiographical memory and social representation. Psychoanalyst/psychologists Peter Fonagy and Mary Target have attempted to bring attachment theory and psychoanalysis into a closer relationship through cognitive science as mentalization. Mentalization, or theory of mind, is the capacity of human beings to guess with some accuracy what thoughts, emotions and intentions lie behind behaviours as subtle as facial expression. This connection
between theory of mind and the internal working model may open new areas of study, leading to alterations in attachment theory. Since the late 1980s, there has been a developing rapprochement between attachment theory and psychoanalysis, based on common ground as elaborated by attachment theorists and researchers, and a change in what psychoanalysts consider to be central to psychoanalysis. Object relations models which emphasise the autonomous need for a relationship have become dominant and are linked to a growing recognition within psychoanalysis of the importance of infant development in the context of relationships and internalised representations. Psychoanalysis has recognised the formative nature of a child’s early environment including the issue of childhood trauma. A psychoanalytically based exploration of the attachment system and an accompanying clinical approach has emerged together with a recognition of the need for measurement of outcomes of interventions.

Authors considering attachment in non-western cultures have noted the connection of attachment theory with Western family and child care patterns characteristic of Bowlby’s time.

One focus of attachment research has been the difficulties of children whose attachment history was poor, including those with extensive non-parental child care experiences. Concern with the effects of child care was intense during the so-called

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"day care wars" of the late 20th century, during which some authors stressed the deleterious effects of day care. As a result of this controversy, training of child care professionals has come to stress attachment issues, including the need for relationship-building by the assignment of a child to a specific carer. Although only high-quality child care settings are likely to provide this, more infants in child care receive attachment-friendly care than in the past.

Another significant area of research and development has been the connection between problematic attachment patterns, particularly disorganized attachment, and the risk of later psychopathology. A third has been the effect on development of children having little or no opportunity to form attachments at all in their early years. A natural experiment permitted extensive study of attachment issues as researchers followed thousands of Romanian orphans adopted into Western families after the end of the Nicolae Ceauşescu regime. The English and Romanian Adoptees Study Team, led by Michael Rutter, followed some of the children into their teens, attempting to unravel the effects of poor attachment, adoption, new relationships, physical problems and medical issues associated with their early lives. Studies of these adoptees, whose initial conditions were shocking, yielded reason for optimism as many of the children developed quite well. Researchers noted that separation from familiar people is only one of many factors that help to determine the quality of development. Although higher rates of atypical insecure attachment patterns were found compared to native-born or early-adopted samples, 70% of later-adopted children exhibited no marked or severe attachment disorder behaviours.

Authors considering attachment in non-Western cultures have noted the connection of attachment theory with Western family and child care patterns characteristic of Bowlby's time. As children's experience of care changes, so may attachment-related experiences. For example, changes in attitudes toward female sexuality have greatly increased the numbers of children living with their never-married mothers or being cared for outside the home while the mothers work. This social change has made it more difficult for childless people to adopt infants in their own countries. There has been an increase in the number of older-child adoptions and adoptions from third-world sources in first-world countries. Adoptions and births to same-sex couples have increased in number and gained legal protection, compared to their status in Bowlby's time. Issues have been raised to the effect that the dyadic model characteristic of attachment theory cannot address the complexity of real-life social experiences, as infants often have multiple relationships within the family and in child care settings. It is suggested these multiple relationships influence one another reciprocally, at least within a family.

Principles of attachment theory have been used to explain adult social behaviours, including mating, social dominance and hierarchical power structures, group coalitions, and negotiation of reciprocity and justice. Those explanations have been

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used to design parental care training, and have been particularly successful in the
design of child abuse prevention programmes.

**Biology of attachment**

Attachment theory proposes that the quality of caregiving from at least the primary
carer is key to attachment security or insecurity. In addition to longitudinal studies,
there has been psychophysiological research on the biology of attachment. Research
has begun to include behaviour genetics and temperament concepts. Generally
temperament and attachment constitute separate developmental domains, but
aspects of both contribute to a range of interpersonal and intrapersonal
developmental outcomes. Some types of temperament may make some individuals
susceptible to the stress of unpredictable or hostile relationships with caregivers in
the early years. In the absence of available and responsive caregivers it appears that
some children are particularly vulnerable to developing attachment disorders.

In psychophysiological research on attachment, the two main areas studied have
been autonomic responses, such as heart rate or respiration, and the activity of the
hypothalamic-pituitary-adrenal axis. Infants’ physiological responses have been
measured during the Strange Situation procedure looking at individual differences
in infant temperament and the extent to which attachment acts as a moderator.
There is some evidence that the quality of caregiving shapes the development of the
neurological systems which regulate stress.

Another issue is the role of inherited genetic factors in shaping attachments: for
example one type of polymorphism of the DRD2 dopamine receptor gene has been
linked to anxious attachment and another in the 5-HT2A serotonin receptor gene
with avoidant attachment. This suggests that the influence of maternal care on
attachment security is not the same for all children. One theoretical basis for this is
that it makes biological sense for children to vary in their susceptibility to rearing
influence.

**Practical applications**

As a theory of socioemotional development, attachment theory has implications and
practical applications in social policy, decisions about the care and welfare of
children and mental health.

**Child care policies**

Social policies concerning the care of children were the driving force in Bowlby’s
development of attachment theory. The difficulty lies in applying attachment
concepts to policy and practice. This is because the theory emphasises the
importance of continuity and sensitivity in caregiving relationships rather than a

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behavioural approach on stimulation or reinforcement of child behaviours. In 2008 C.H. Zeanah and colleagues stated, "Supporting early child-parent relationships is an increasingly prominent goal of mental health practitioners, community based service providers and policy makers ... Attachment theory and research have generated important findings concerning early child development and spurred the creation of programs to support early child-parent relationships".

Historically, attachment theory had significant policy implications for hospitalised or institutionalised children, and those in poor quality daycare. Controversy remains over whether non-maternal care, particularly in group settings, has deleterious effects on social development. It is plain from research that poor quality care carries risks but that those who experience good quality alternative care cope well although it is difficult to provide good quality, individualised care in group settings.

Attachment theory has implications in residence and contact disputes and applications by foster parents to adopt foster children. In the past, particularly in North America, the main theoretical framework was psychoanalysis. Increasingly attachment theory has replaced it, thus focusing on the quality and continuity of caregiver relationships rather than economic well-being or automatic precedence of any one party, such as the biological mother. However, arguments tend to focus on whether children are "attached" or "bonded" to the disputing adults rather than the quality of attachments. Rutter noted that in the UK, since 1980, family courts have shifted considerably to recognize the complications of attachment relationships. Children tend to have security-providing relationships with both parents and often grandparents or other relatives. Judgements need to take this into account along with the impact of step-families. Attachment theory has been crucial in highlighting the importance of social relationships in dynamic rather than fixed terms.

Attachment theory can also inform decisions made in social work and court processes about foster care or other placements. Considering the child's attachment needs can help determine the level of risk posed by placement options. Within adoption, the shift from "closed" to "open" adoptions and the importance of the search for biological parents would be expected on the basis of attachment theory. Many researchers in the field were strongly influenced by it.

**Clinical practice in children**

Although attachment theory has become a major scientific theory of socioemotional development with one of the broadest, deepest research lines in modern psychology, it has, until recently, been less used in clinical practice than theories with far less empirical support.
A young father dressed in a pink cotton shirt holds his child and gazes at the camera looking proud but tired. The little girl, wearing a sleeveless dress, sits on her father’s arm and frowns directly at the camera.

In the early months of life, babies will direct attachment behaviours towards anyone in the vicinity. As attachment develops, so does age-appropriate stranger wariness.

This may be partly due to lack of attention paid to clinical application by Bowlby himself and partly due to broader meanings of the word ‘attachment’ used amongst practitioners. It may also be partly due to the mistaken association of attachment theory with the pseudoscientific interventions misleadingly known as "attachment therapy".
Prevention and treatment

In 1988, Bowlby published a series of lectures indicating how attachment theory and research could be used in understanding and treating child and family disorders. His focus for bringing about change was the parents' internal working models, parenting behaviours and the parents' relationship with the therapeutic intervenor. Ongoing research has led to a number of individual treatments and prevention and intervention programmes. They range from individual therapy to public health programmes to interventions designed for foster carers. For infants and younger children, the focus is on increasing the responsiveness and sensitivity of the caregiver, or if that is not possible, placing the child with a different caregiver. An assessment of the attachment status or caregiving responses of the caregiver is invariably included, as attachment is a two-way process involving attachment behaviour and caregiver response. Some programmes are aimed at foster carers because the attachment behaviours of infants or children with attachment difficulties often do not elicit appropriate caregiver responses. Modern prevention and intervention programmes are mostly in the process of being evaluated.

Reactive attachment disorder and attachment disorder

One atypical attachment pattern is considered to be an actual disorder, known as reactive attachment disorder or RAD, which is a recognized psychiatric diagnosis (ICD-10 F94.1/2 and DSM-IV-TR B13.89). The essential feature of reactive attachment disorder is markedly disturbed and developmentally inappropriate social relatedness in most contexts that begins before age five years, associated with gross pathological care. There are two subtypes, one reflecting a disinhibited attachment pattern, the other an inhibited pattern. RAD is not a description of insecure attachment styles, however problematic those styles may be; instead, it denotes a lack of age-appropriate attachment behaviours that amounts to a clinical disorder. Although the term "reactive attachment disorder" is now popularly applied to perceived behavioural difficulties that fall outside the DSM or ICD criteria, particularly on the Web and in connection with the pseudo-scientific attachment therapy, "true" RAD is thought to be rare.

"Attachment disorder" is an ambiguous term, which may be used to refer to reactive attachment disorder or to the more problematical insecure attachment styles (although none of these are clinical disorders). It may also be used to refer to proposed new classification systems put forward by theorists in the field and is used within attachment therapy as a form of unvalidated diagnosis. One of the proposed new classifications, "secure base distortion" has been found to be associated with caregiver traumatization.

Clinical practice in adults and families

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As attachment theory offers a broad, far-reaching view of human functioning, it can enrich a therapist's understanding of patients and the therapeutic relationship rather than dictate a particular form of treatment. Some forms of psychoanalysis-based therapy for adults—within relational psychoanalysis and other approaches—also incorporate attachment theory and patterns. In the first decade of the 21st century, key concepts of attachment were incorporated into existing models of behavioural couple therapy, multidimensional family therapy and couple and family therapy. Specifically attachment-centred interventions have been developed, such as attachment-based family therapy and emotionally focused therapy.

Attachment theory and research laid the foundation for the development of the understanding of "mentalization" or reflective functioning and its presence, absence or distortion in psychopathology. The dynamics of an individual's attachment organization and their capacity for mentalization can play a crucial role in the capacity to be helped by treatment.
Evolutionary developmental psychology involves the expression of evolved, epigenetic programs, as described by the developmental systems approach, over the course of ontogeny. There have been different selection pressures on organisms at different times in ontogeny, and some characteristics of infants and children were selected in evolution to serve an adaptive function at that time in their life history rather than to prepare individuals for later adulthood. Examples of such adaptive functions of immaturity are provided from infancy, play, and cognitive development. Most evolved psychological mechanisms are proposed to be domain specific in nature and have been identified for various aspects of children’s cognitive and social development, most notably for the acquisition of language and for theory of mind. Differences in the quality and quantity of parental investment affect children’s development and influence their subsequent reproductive and childcare strategies. Some sex differences observed in childhood, particularly as expressed during play, are seen as antecedents and preparations for adult sex differences. Because evolved mechanisms were adaptive to ancestral environments, they are not always adaptive for contemporary people, and this mismatch of evolved mechanisms with modern environments is seen in children’s maladjustment to some aspects of formal schooling. We argue that an evolutionary perspective can be valuable for developing a better understanding of human ontogeny in contemporary society and that a developmental perspective is important for a better understanding of evolutionary psychology.

Central to evolutionary developmental psychology is the idea that there are (and were in the environment of evolutionary adaptedness) different adaptive pressures on individuals at different times in ontogeny.

We further propose that an evolutionary account provides insight not only into developmental function, aspects of ontogeny that presumably characterize children universally and predictably, but also into individual differences. An evolutionary account suggests that there are alternative strategies to recurrent problems that human children faced in our evolutionary past. Such a perspective suggests that individual differences in developmental patterns are not necessarily the result of idiosyncratic experiences but rather are predictable, adaptive responses to environmental pressures.

In the sections below, we first outline some of the assumptions of the field of evolutionary psychology as they have been developed since the mid-1980s (e.g., Buss, 1995; Cosmides & Tooby, 1987; Daly & Wilson, 1988; Tooby & Cosmides, 1992). Our emphasis and our examples, however, will reflect evolutionary psychology as it relates to development. Next, we introduce concepts especially pertinent to evolutionary developmental psychology, specifically the developmental systems approach, the differential influence of natural selection at different points in ontogeny, and the development of evolved psychological mecha-
nisms. We then examine selective areas of research in developmental psychology that have benefited from a specific evolutionary perspective, including the effects of parental investment on children’s development and developmental antecedents of adult sex differences. We conclude by looking at the impact that an evolutionary perspective can have for establishing a better understanding of children’s psychological functioning in contemporary culture.

EVOLUTIONARY PSYCHOLOGY

Darwin’s (1859/1958) theory of evolution, as presented in the Origin of Species, is probably the best and most enduring general explanation we have of the human condition and our adaptation to the world. The basic principles behind Darwin’s theory are relatively simple. First, there are many more members of a species born in each generation than will survive, termed superfecundity. Second, all members (at least in sexually reproducing species) have different combinations of traits; that is, there is variation in physical and behavioral characteristics among individuals within a species. Third, this variation is heritable. Fourth, characteristics that result in an individual surviving and reproducing tend to be selected as a result of an interaction between individuals and their environment and are thus passed down (via one’s genes) to future generations, whereas the traits of nonsurvivors are not. That is, genetically based variations in physical or psychological features of an individual interact with the environment, and, over many generations, these features tend to change in frequency, resulting, eventually, in species-wide traits in the population as a whole. Thus, through the process of natural selection, adaptive changes in individuals, and eventually species, arise.

Darwin referred to the reproductive success of individuals as reflecting their reproductive fitness, which basically refers to the likelihood that an individual will become a parent and a grandparent. Contemporary evolutionary theorists, taking advantage of scientific advances that have occurred since Darwin’s time (particularly in genetics), use the concept of inclusive fitness (Hamilton, 1964). Inclusive fitness includes Darwin’s concept of reproductive fitness (in this case, having many offspring) but also considers the influence that an individual may have in getting other copies of his or her genes into subsequent generations. For example, by having one child, 50% of a woman’s genes are passed on to the next generation. But by helping to rear her four nieces and nephews, each of whom shares, on average, 25% of her genes, a woman can further increase the copies of her genes in the next generation, thereby increasing her inclusive fitness.

Evolutionary psychology takes these basic tenets of Darwin’s theory and the advancements made to it over the past 140 years (usually termed neoDarwinism) and applies them specifically to human psychological functioning. Although, as in any fertile area of intellectual inquiry, there are some healthy disagreements about specifics of evolutionary theory applied to humans, there are certain aspects of this new paradigm that, in one form or another, most practitioners of the field adhere to.

Evolved Psychological Mechanisms

Evolutionary psychologists have proposed that psychological mechanisms are the missing link in the evolution of human behavior. This is a position presented by Cosmides and Tooby (1987, p. 277), who proposed that cognitive processes “in interaction with environmental input, generate manifest behavior. The causal link between evolution and behavior is made through psychological mechanisms.” According to Cosmides and Tooby, at least in humans, adaptive behavior is predicated on adaptive thought. Natural selection operates on the cognitive level—information-processing programs evolved to solve real-world problems. Moreover, mechanisms evolved to solve specific adaptive problems faced by our ancestors in the environment of evolutionary adaptiveness. These are domain-specific mechanisms, what Cosmides and Tooby (1987) referred to as Darwinian algorithms. That is, rather than influencing general intelligence, for instance, Darwinian algorithms affect very specific cognitive operations, such as face recognition, language acquisition, or the processing of certain types of social interactions. Pinker (1997, p. 21) captured this perspective succinctly: “The mind is organized into modules or mental organs, each with a specialized design that makes it an expert in one area of interaction with the world. The modules’ basic logic is specified by our genetic program. Their operation was shaped by natural selection to solve problems of the hunting and gathering life led by our ancestors in most of our evolutionary history.”

If we possess domain-specific mechanisms for solving specific problems, the implication is that our mind is not a general-purpose problem solver and that some things will be very difficult or impossible to learn. Stated differently, this perspective proposes that there are constraints on learning (Gelman & Williams, 1998). Constraints imply restrictions, and restrictions are usually thought of negatively. The human mind is notable for its flexibility. We, more than any other species, live by our wits and have been able
to adapt to the most varied range of environments of any large animal. But constraints, from this perspective, enable learning, rather than hamper it.

Children enter a world of sights, sounds, objects, language, and other people. If all types of learning were truly equiprobable, they would be overwhelmed by stimulation that bombards them from every direction. Instead, infants and young children are constrained to process certain information in “core domains” (such as the nature of objects, language) in certain ways. They come into the world with some idea of how the world is structured, and this leads to faster and more efficient processing of information within specific domains. According to Gelman and Williams (1998, p. 600): “From an evolutionary perspective, learning cannot be a process of arbitrary and completely flexible knowledge acquisition. In core domains, learning processes are the means to functionally defined ends: acquiring and storing the particular sorts of relevant information which are necessary for solving particular problems.”

The evolved psychological mechanisms proposed by evolutionary psychologists have some things in common with the innate-releasing mechanisms, or fixed-action patterns, identified by ethologists to explain the often complex behaviors of animals in response to specific environmental conditions. There are also some differences, however. For example, Tinbergen (1951) described the aggressive behavior of male stickleback fish in response to the presence of the red belly of another male stickleback fish (the red belly being an indication of a readiness to mate). Stereotypic aggressive behavior was displayed to any red stimulus that closely resembled the underbelly of another male fish, and this is adaptive, in that it limits access of other males to a prospective mate. Such responses could be thought of as evolved psychological mechanisms; but most (if not all) such mechanisms possessed by humans are more flexible in nature, reflecting general propensities to respond in certain ways depending on the environmental conditions. It is not the case, for example, that human males act aggressively toward any male stranger who enters their territory (red belly or not). This pattern may be found in some cultures, however, and depending on the social organization of the group and the developmental history of the individual, how a person (male or female) responds to a stranger will vary. Nonetheless, according to evolutionary psychological theory, what underlies such responding are evolved psychological mechanisms, which find their expression as a result of interaction with the environment over the course of development.

Functional Analysis

Evolutionary psychological explanations focus on adaptationist thinking—stressing the function of a behavior or trait. For example, pregnancy sickness is quite common during the early months of pregnancy, occurring in the majority of women around the world (e.g., Tierson, Olson, & Hook, 1986). Symptoms include nausea, vomiting, and food aversions. Given these symptoms, pregnancy sickness is understandably considered an illness. Profet (1992), in an elegant review of the literature, however, showed that pregnancy sickness can be better understood as an adaptation to protect the health of the developing fetus. For example: (1) modern women acquire aversions to food that are highest in toxins and tend not to develop aversions to foods that are more apt to be toxin-free; (2) pregnancy sickness, including food aversions, corresponds to the time when an unborn child is most susceptible to the effects of teratogens; (3) pregnancy sickness appears to be universal; and (4) women who experience pregnancy sickness have lower levels of spontaneous abortions than women who do not become ill (Weigel & Weigel, 1989).

Profet’s functional analysis of pregnancy sickness demonstrates the benefits that an evolutionary perspective can have. What has typically been viewed as a dysfunctional state, for which medication is frequently prescribed, is actually a well-adapted mechanism that serves to foster the development of the unborn child. Although the discomfort associated with pregnancy sickness is real, its consequence is an embryo/fetus protected from environmental toxins that would impair its development. It is ironic to note that thalidomide, the drug that led to serious deformations of children’s limbs when taken early in pregnancy, was sometimes prescribed to alleviate pregnancy sickness.

Not all current aspects of cognition, behavior, or morphology are the result of adaptation. Evolution produces at least three products (Buss, Haselton, Shackelford, Bleske, & Wakefield, 1998): adaptations, by-products, and noise. Adaptations refer to reliably developing, inherited characteristics that came about as a result of natural selection and helped to solve some problems of reproduction or survival in the environment of evolutionary adaptedness. The umbilical cord would be an example of an adaptation. By-products are characteristics that did not solve some recurring problem and have not been shaped by natural selection but are a consequence of being associated with some adaptation. The belly button would be an example of a by-product. Finally, noise refers to random effects that may be attributed to

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mutations, changes in the environment, or aberrations of development, such as the shape of one's belly button. As this tripartite classification indicates, a characteristic may have evolved in a species but not have been designed by the forces of natural selection. The evolutionary psychologist's task is to identify and describe psychological mechanisms that may have served to solve survival or reproduction problems in our species' evolutionary past and to differentiate those mechanisms from characteristics that may be better classified as by-products or noise.

Furthermore, some adaptations may have negative effects (by-products) associated with them. For example, the enlarged skull of a human fetus is surely an adaptation (housing a large brain, associated with greater learning ability and behavioral flexibility); however, because of the size of the baby's head, birth is difficult (because of limits on the width of a woman's hips that result from constraints of bipedality), and many women and infants have died in childbirth. The cost/benefit trade-off, however, was such that the benefits of an enlarged brain outweighed the detriments of neonatal and maternal death.

It is worth commenting briefly here on the concept of cost–benefit analysis and its significance to evolutionary psychology. Cost–benefit analyses assume that behaviors have both benefits, or functions, and costs, or risks. Behaviors will be naturally selected if the benefits outweigh the costs: The benefits do not have to be absolutely high but only greater than associated costs (Krebs & McCleery, 1984). Also, from a developmental perspective, the benefits associated with costs/risks can be either immediate or delayed. For example, children's play, which will be discussed in greater detail below, can have substantial costs, sometimes resulting in injury or death (e.g., Cataldo et al., 1986; Peterson, Brezal, Oliver, & Bull, 1997). Physical play also requires energy, and the energy demands of play must be considered in light of other caloric requirements (e.g., calories required for basic metabolism, growth, and more direct learning tutorials; see Pellegrini, Hovart, & Huberty, 1998). What benefits do children reap from taking such risks? Some appear to be immediate, such as the fostering of muscle and skeletal development, whereas others appear to be delayed, such as developing social skills that will be important in adult life. Regardless of when the benefit is realized, most adaptations have some risks associated with them and do not reflect “perfect” solutions to recurrent problems but rather trade-offs that have produced, on average, over evolutionary time, more benefits than costs.

The Role of the Environment

Counter to some common misconceptions, evolved psychological mechanisms exist in transactional relationships with environmental factors. Believing that certain behaviors are under the influence of evolved psychological mechanisms does not imply that aspects of the physical and social environment do not play a critical role in the development or form of behavior. In fact, Quite the opposite is true; most evolved mechanisms are quite sensitive to variations in environments and are expressed differently depending on one's surroundings (see Gottlieb, 1992, 1998). This point is critical, because humans live in a wide variety of environments and require flexible cognitive and behavioral systems to survive. Moreover, because evolved mechanisms will be expressed differently in different environments, evolutionary psychology can contribute to our understanding of individual differences. For the most part, evolutionary psychology has emphasized what is universal about the human species. The recognition, however, that genes are differentially activated by different experiences in development (see discussion of developmental systems approach below), coupled with the idea of natural selection, provides a model for predicting how different environmental conditions will result in different behavioral phenotypes.

EVOLUTIONARY DEVELOPMENTAL PSYCHOLOGY

The value of a behavior can be understood in terms of “ultimate” function (i.e., “fitness,” or producing offspring, who, in turn, survive to reproduce) or in terms of beneficial consequences of that behavior to the organism during its lifespan (Hinde, 1980). Tinbergen (1963) stated the benefit of asking “four questions” to understand the value of behavior: What is the immediate benefit (internal and external to the organism)? What is the immediate consequence? How does it develop within the species (ontogeny)? How did it evolve across species (phylogeny)? To answer these questions, we must take a developmental perspective; we must appreciate the adaptive value of a particular behavior at a specific time in development. This implies that different behaviors or characteristics of an animal may be selected at different times in ontogeny. In other words, over the course of evolution, natural selection has functioned to adapt organisms to their current environments, and the environments and selective pressures experienced by our ancestors early in their ontogeny differed from the environments and selective pressures experienced by our ancestors later in their lifespan.
The Role of the Environment across Ontogeny in Evolutionary Psychological Perspective: The Developmental Systems Approach

If evolved psychological mechanisms underlie contemporary behaviors and thought patterns, what role can culture, or experience in general, play? A common misconception that was held by many psychologists until recently about evolutionary explication (and may still be held by some today) is that, if an ability is said to have "evolved" or to have an innate component, the result is one of biological, or genetic, determinism (see Charlesworth, 1992; Morss, 1990). If it is in the genes (which it must be if it evolved), it cannot be changed. This is not the case, and evolutionary psychologists are explicit about the role that the environment plays (and did play) in the expression of evolved psychological mechanisms.

Evolutionary psychologists assume that organisms adapt and evolve, through natural selection, by their transactions with the environment. Organisms affect their environment (e.g., by choosing and then "furnishing their niches"), and environments, in turn, affect the organism (e.g., by changing behaviors to meet the particular demands of a setting). Because of this transactional relation between organism and environment, we must study organisms interacting with their environments if we want to understand adaptation and development. This position rejects any simplistic biological determinism such as genetic endowment having a main effect on cognitive functioning (see Pellegrini & Horvat, 1995, for a discussion) or on social development (Pellegrini & Smith, 1998). More specifically, we believe that the developmental systems approach provides a proper appreciation of how biology and environment, at a variety of levels, interact to produce behavior and development and that such a model can be used to explain how evolved psychological mechanisms are translated into behavior.

The core concept of the developmental systems approach is that of epigenesis, which Gottlieb (1991a, p. 7) defined as "the emergence of new structures and functions during the course of development." Gottlieb (1991a, 1998; Gottlieb, Wahlsten, & Lickliter, 1998) stated that epigenesis reflects a bidirectional relation between all levels of biological and experiential factors, such that genetic activity both influences and is influenced by structural maturation, which is bidirectionally related to function and activity. This relation can be expressed as follows:

- genetic activity (DNA ↔ RNA ↔ proteins) ↔
- structural maturation ↔ function, activity.

From this perspective, functioning at one level influences functioning at adjacent levels. For example, genes code for the production of protein molecules, which in turn determine the formation of structures, such as muscle or nerve cells. But activity of these and surrounding cells can serve to turn on or off a particular gene, thereby causing the commencement or cessation of genetic activity. Also, self-produced activity or stimulation from external sources can alter the development of sets of cells. From this viewpoint, there are no simple genetic or experiential causes of behavior; all development is the product of epigenesis, with complex interactions occurring among multiple levels (see also Johnson, 1998).

Evolved psychological mechanisms can be thought of as genetically coded "messages" that, following epigenetic rules, interact with the environment to produce behavior. The experiences of each individual, however, are unique, beginning before birth, and if the developmental system's account of ontogeny closely mirrors reality, there should be substantial plasticity in development. Yet, despite the fact that genes will be expressed differently in different environments, almost all members of a species (human or otherwise) develop in a species-typical pattern. How can this be so and the developmental systems perspective still be valid?

The answer lies in the fact that humans (or chimpanzees or ducks) inherit not only a species-typical genome but also a species-typical environment. According to Lickliter (1996, pp. 90–91), "... the organism-environment relationship is one that is structured on both sides. That is, it is a relation between a structured organism and a structured environment. The organism inherits not only its genetic complement, but also the structured organization of the environment into which it is born." To the extent that an organism grows up under conditions similar to that in which its species evolved, development will follow a species-typical pattern. Tooby and Cosmides (1992) have argued that complex, psychological mechanisms evolve only under circumstances when the environments are relatively stable over many generations. Thus, over long periods of time, members of a species could "expect" certain types of environments, and they evolved species-typical solutions to deal with such stable environments. For example, in the wild, a mother duck will lay several eggs together in a nest and stay close by the eggs until they hatch. While in the egg, the ducklings begin to vocalize and so hear themselves, the vocalizations of their brood mates, and those of their mother. How might these "experiences" influence later species-typical behavior?

In a procedure developed by Gottlieb (1976, 1991b), ducklings, while still in the egg, were isolated from other eggs and their mother so that they could not hear...
the vocalizations of other animals. Their vocal chords were also treated so that they could not produce any sound (a condition that wears off several days after hatching). Following hatching, these animals were placed in a large container and heard the maternal call of two species—their own and another—played through speakers on opposite sides of the container. Most untreated birds in this situation approached the call of their own species, seeming to know “instinctively” which call is that of their species and which is not. However, ducklings who were prevented from hearing any duck vocalizations, either their mothers, those of other ducklings still in their eggs, or their own, failed to make this discrimination and were just as likely to approach the call of an alien species as that of their own. Thus, prehatching experience plays a critical role in posthatching species-typical behavior. The reason that nearly all ducks approach the species-typical call after hatching is that nearly all ducks inherit not only the genetic disposition to make such a selection but also the species-typical environment that provides the necessary experiences for such a pattern to develop.

A related example demonstrates how providing an animal with species-atypical experience (rather than depriving it of experience as in the Gottlieb studies) can disrupt development. Lickliter (1990) removed part of the eggshell 2 to 3 days before hatching of bob-white quail and provided visual experience (patterned light) to these animals. Following hatching, the quail chicks were tested in a situation similar to that used by Gottlieb, with the maternal call of a quail coming from one speaker and that of a chicken coming from another. A group of control animals that had the egg shell removed but did not receive any additional visual experience displayed the species-typical pattern: They approached the maternal call of their own species on most occasions. In contrast, most of the experimental animals showed no preference or approached the maternal call of the chicken. The animals that received extra visual stimulation showed enhanced visual discrimination abilities relative to control animals, thus demonstrating a facility effect of the early visual stimulation; but this came at a cost to auditory discrimination abilities. Other research, using ducks, quail, and rats as subjects, has demonstrated that providing young animals with stimulation that is outside the species norm has negative consequences for development (e.g., Gottlieb, Tomlinson, & Radell, 1989; Kenny & Turkewitz, 1986; Lickliter & Lewkowitz, 1995; Spear, 1984). What results such as these demonstrate is that behaviors (here related to infant–mother attachment) that are found in almost all normal members of a species are influenced by often subtle characteristics of the environment. Evolved psychological mechanisms at the human level can be similarly viewed. Strong species-wide biases may exist for certain behaviors, but how any particular evolved mechanism is expressed will vary with environmental conditions experienced at certain times in development.

The substantial plasticity characteristic of early development provides a behavioral route for evolutionary change (Bateson, 1988; Gottlieb, 1992). For example, Gottlieb (1992) proposed that large-brained animals with extended juvenile periods display substantial behavioral and cognitive malleability and that this malleability can result in drastic changes in a phenotype when a young animal is exposed to a species-atypical environment. In this way, changes in developmental rate or expressions of novel behavior, brought about by changes in environmental conditions, can serve as the fodder for natural selection, and lead, eventually, to species-wide changes in a phenotype.

Some examples of how modified early environments can alter species-typical behavior that are particularly pertinent to human evolution come from observations of human-reared (enculturated) great apes. Great apes (mostly common chimpanzees) who have been raised by humans, much as human children, often display more human-like cognitive abilities than those displayed by mother-reared animals (see Call & Tomasello, 1996). For example, the most successful of the “language-trained” apes have been enculturated (e.g., Gardner & Gardner, 1969; Savage-Rumbaugh et al., 1993). Similarly, mother-reared apes rarely demonstrate imitation of tool use, particularly deferred imitation (i.e., imitating a behavior following a significant delay). In contrast, enculturated common chimpanzees, bonobos, and orangutans have all been shown to display above-chance levels of deferred imitation of object manipulation (Bering, Bjorklund, & Ragan, in press; Bjorklund, Bering, & Ragan, 2000; Tomasello, Savage-Rumbaugh, & Kruger, 1993). Deferred imitation has traditionally been interpreted as requiring symbolic representation (e.g., Meltzoff, 1995; Piaget, 1962), and aspects of these apes’ atypical, human-like rearing history apparently prompted the emergence of representational skills, at least in limited contexts, which are absent from their mother-reared conspecifics.

It is not possible at this time to say what aspects of the apes’ experiences are responsible for the change in their cognitive abilities and behavior toward more human-like thinking. One attractive candidate, however, has been joint-attentional strategies, whereby adults draw the attention of the young animal to an object (Call & Tomasello, 1996). An important aspect of this research is that it provides an experiential vehicle by which our hominid ancestors (using contemporary great apes as a
The Influence of Natural Selection at Different Times in Ontogeny

Ontogenetic adaptations and adaptive immaturity. In keeping with the basic argument that there are different selection pressures on organisms at different times in development is the idea that some aspects of infancy and childhood are not preparations for later adulthood but were selected in evolution to serve an adaptive value for that specific time in development (Bjorklund, 1997a; Oppenheim, 1981). As a result, certain immature aspects of a young animal often have adaptive value. They were selected in evolution to help keep the animal alive at that time in ontogeny. This perspective has long been held by developmental psychobiologists, whose typical subjects are birds and infrahuman mammals (e.g., Gottlieb et al., 1998; Spear, 1984; Turkewitz & Kenny, 1982), but has been less popular with developmental psychologists who study human ontogeny and whose focus has often been to find behaviors or traits early in life that are predictive of later development.

Many adaptations are limited to a particular time in development; they facilitate the young organism’s chances of surviving to adulthood and eventually reproducing. This is reflected by the concept of ontogenetic adaptations—neurobehavioral characteristics that serve specific adaptive functions for the developing animal (see Oppenheim, 1981). These are not simply incomplete versions of adult characteristics but have specific roles in survival during infancy or youth and disappear when they are no longer necessary. For example, embryos of most species have specializations that serve to keep them alive but that disappear or are discarded once they serve their purpose, such as the yolk sac, embryonic excretory mechanisms, and hatching behaviors in embryonic birds (Oppenheim, 1981).

Ontogenetic adaptations in human infancy. Such adaptations are not limited to prenatal behaviors. Infant reflexes, such as the sucking reflex in mammals, are obvious postnatal behaviors that serve a specific function and then disappear. Some aspects of human infants’ cognition have also been interpreted as serving a specific function, only to disappear or to become reorganized later in life. For example, the imitation of facial gestures by newborns (e.g., Meltzoff & Moore, 1985) has been characterized by some as an ontogenetic adaptation (e.g., Bjorklund, 1987). Under the appropriate conditions, newborn infants will imitate a range of facial gestures, although imitation of facial expressions decreases to chance levels by about 2 months of life (e.g., Abravanel & Sigafouos, 1984; Jacobson, 1979). Rather than serving to acquire new behaviors, which seems to be the primary function of imitation in later infancy and childhood, several researchers have speculated that imitation has a very different and specific function for the neonate. For example, Jacobson (1979) suggested that imitation of facial gestures is functional in nursing; Legerstee (1991) proposed that it serves as a form of prelinguistic communication; and Bjorklund (1987) suggested that it facilitates mother–infant social interaction at a time when infants cannot intentionally direct their gaze and control their head movements in response to social stimulation. Heimann (1989) provided support for these latter interpretations by reporting significant correlations between degree of neonatal imitation and subsequent quality of mother–infant interaction at 3 months. Thus, early imitation appears to have a specific adaptive function for the infant (i.e., to facilitate communication and social interaction) that is presumably different from the function that imitation will serve in the older infant and child (but see Meltzoff & Moore, 1992, for a different interpretation). Presumably, these different functions for similar behavior at different times in ontogeny were selected over evolutionary time.

Play as an ontogenetic adaptation. There are similar examples from social development, of which play is perhaps the most obvious. Play is in many ways a quintessential developmental construct. For instance, it has been used to define, relationally, a developmental period: The juvenile/childhood period is often defined as the period during which playful behavior is dominant. Correspondingly, play is sometimes defined as that behavior which is exhibited by juveniles (Martin & Caro, 1985). Thus, play has been considered to be an integral and important part of childhood and one which accounts for a substantial portion of children’s time and energy budgets (Hinde, 1974). The ubiquity of play in juveniles’ lives has led many scholars to assume that play serves a very important developmental function. For example, some scholars have listed over 30 possible functions of play (Baldwin & Baldwin, 1977).

More exact definitions of play have been proffered by both ethologists (e.g., Martin & Caro, 1985) and child developmentists (Rubin, Fein, & Vandenbergh, 1983), and they agree on a common consequential definition of play: It is behavior that appears to have no apparent function or where the means of a behavior are more important than the ends. In the ethnological literature, this sort of “purposeless” behavior has typically been divided into object play, social play, and physical play (Fagen, 1981; Martin & Caro, 1985).
Specifically, play can occur with objects, as in the case of Piaget’s (1962) sensorimotor play where very young children and juveniles from a number of primate species (e.g., Kohler, 1925) perform a variety of novel behavioral routines with objects. Play can be solitary, as in cases where individuals play with materials, or social, where they play with an adult or a peer. Physical play is vigorous and can be either solitary (e.g., swinging) or social (e.g., wrestling with a peer or parent). For children, the paradigmatic case of play is social-fantasy play, a uniquely human variety of play (McCune-Nicholich & Fenson, 1984; Smith & Vollstedt, 1985), although “symbolic play” has been inferred in nonhuman primates reared by humans (i.e., enculturated; see Tomasello & Call, 1997).

Some students of both animals’ and children’s play have seen it as a source of creativity that may eventually lead to discovering new ways to solve old problems (Biben, 1998; Oppenheim, 1981); and, because of the youthful tendency toward play and curiosity in animals, it is likely that innovations will be introduced by the young rather than by adults. Support for this contention comes from observations of the skill of potato washing in Japanese macaque monkeys (Kawai, 1965). A group of Japanese scientists provisioned a troop of wild monkeys with sweet potatoes, which were often sandy. One juvenile monkey learned to wash potatoes in sea water before eating them, and this was subsequently learned by other juveniles, and then some adult females. (Few adult males ever learned this.) This innovation was then passed on to infants as part of the culture. Although it is unlikely that important cultural innovations will be made through the play of human children, the discoveries children make through play may serve as the basis of later innovations or true creativity, which become important later in life.

The functional question of play is particularly interesting in light of its most common definitional attribute—serving no apparent purpose. How can a behavior be both developmentally important yet serve no apparent purpose? Most theories, especially those in the child development literature, assume that the benefits of play are deferred until after the period of childhood (Groos, 1898, 1901; Vygotsky, 1978). As Kagan (1996) notes, this assumption may be due to the bias toward the importance of early experience in human development. In these theories, children’s play is a way in which to learn skills important in adulthood. Consequently, play is viewed as an imperfect version of adult behavior. In Bateson’s (1976) terms, this is the scaffolding view of play: Play functions in the assembly of skills and is disassembled when the skills are complete (e.g., Bruner, 1972). The classic example of play serving deferred benefits is where the play-fighting characteristic of juvenile males is seen as practice for adult hunting and fighting skills (Smith, 1982).

An alternative view of play, labeled the metamorphic view by Bateson (1976), holds that play is not an incomplete or imperfect version of adult behavior but is beneficial immediately and specialized to the niche of childhood. In this way, play can be considered a specific adjustment to the context of childhood (Bateson, 1976; Bjorklund, 1997a; Gomendio, 1988; Pellegrini & Bjorklund, 1997; Pellegrini & Smith, 1998). This view is also consistent with the perspective that natural selection exerts functional pressure during the period of childhood. An example of play serving an immediate function holds that the sense of mastery and self-efficacy associated with play probably relates to children experimenting with new and different activities and roles. Once activities are chosen, they should be sustained, which in turn affords opportunities for learning specific skills (Bjorklund & Green, 1992). In a similar vein, boys’ rough-and-tumble play may serve as a way in which to learn and practice social signaling (Martin & Caro, 1985), with exaggerated movements and a play face communicating playful intent. Furthermore, it is used as a way in which boys establish leadership in their peer group and assess others’ strength (Pellegrini & Smith, 1998). Rough-and-tumble play also has immediate nonsocial benefits; it provides opportunities for the vigorous physical exercise that is important for skeletal and muscle development (Bruner, 1972; Dohnow & Bishop, 1970).

The adaptive nature of cognitive immaturity. Infants’ and young children’s immature cognition may also provide some adaptive value that is often overlooked by developmental psychologists and educators (see Bjorklund, 1997a; Bjorklund & Green, 1992; Bjorklund & Schwartz, 1996). For example, young children’s poor metacognition, particularly their poor ability to judge the competency of their own performance, may be adaptive in some contexts. Children who overestimate their own abilities may attempt a wider range of activities and not perceive their less-than-perfect performance as failure (e.g., Bjorklund, Gaulney, & Green, 1993).

Other researchers have speculated that young children’s limited working-memory capacity may facilitate language acquisition. For example, Newport (1991) and Elman (1994) have each proposed that children initially perceive and store only component parts of complex stimuli. They start with single morphemes (usually a single syllable) and gradually increase the complexity and the number of units they can control. This results in a simplified corpus that actually makes...
the job of analyzing language easier. With success and time, maturationally paced abilities gradually increase, as does language learning. Both Newport (1991) and Elman (1994) performed computer simulations in which they restricted the amount of information the simulations could process at any one time (equivalent to restricting how much children can hold in working memory). They each reported that aspects of language were more easily acquired when the input was initially limited (either by presenting a reduced corpus or by limiting the working memory of the system). These researchers concluded that young children’s limited working-memory capacity restricts how much language information can be processed, which simplifies what is analyzed, thereby making the task of language acquisition easier. Preliminary support for the “less is more” position also comes from evidence that adults learn an artificial grammar faster when presented with smaller units of the language (Kersten & Earles, in press). (See Bjorklund & Schwartz, 1996, for a discussion of these ideas applied to remediation of language disabilities in children.)

Issues of accelerating cognitive development. Research on these and other topics of cognitive development (see Bjorklund, 1997a) indicates that certain aspects of immaturity may be adaptive. This raises the question about the wisdom of attempts to accelerate intellectual development, frequently advocated in the United States (see Bjorklund & Schwartz, 1996; Goodman, 1992), as well as the potential negative side effects of early medical interventions. For example, Als (1995) has suggested that preterm human infants have experiences similar in nature to those of Lickliter’s bobwhite quail. In an extensive review of research examining factors that influence preterm infants’ brain development, Als suggested that the unexpected stimulation that preterm infants often receive in hospitals disrupts brain development (particularly the frontal cortex) during sensitive periods and frequently causes impairments resulting in lowered IQ, attention deficits, eye-hand coordination difficulties, impulsivity, and speech problems. These deficits, however, are often accompanied by accelerated or enhanced abilities in other areas, such as mathematics. Als’s interpretation is similar to that of Lickliter’s for bobwhite quail: Stimulation outside the species-typical range can have unforeseen consequences on brain and behavior development. Als (1995, p. 452) writes: “Social contexts evolved in the course of human phylogeny are surprisingly fine-tuned in specificity to provide good-enough environments for the human cortex to unfold, initially intrauterinely, then extrauterinely. . . . With the advances in medical technology, that is, material culture, even very immature nervous systems exist and develop outside the womb. However, the social contexts of traditional special care nurseries bring with them less than adequate support for immature nervous systems . . . leading to maladaptations and disabilities, yet also to accelerations and extraordinary abilities.”

In research with rhesus monkeys, Harlow (1959) reported that animals who began discrimination training at 155 days of age or younger actually performed more poorly on the learning tasks later in life than animals who did not begin training until 190 days of age or older. This was true despite the fact that the younger animals had more experience on the task than the older animals. Harlow (p. 472) concluded that “there is a tendency to think of learning or training as intrinsically good and necessarily valuable to the organism. It is entirely possible, however, that training can either be helpful or harmful, depending upon the nature of the training and the organism’s stage of development.”

These and other findings (see Bjorklund, 1997a) suggest that infants and young children respond to experiences differently than older children and adults and may be adapted for receiving particular amounts and types of stimulation at different points in development. This interpretation, we argue, is consistent with an evolutionary developmental psychological perspective and is apt to be missed or interpreted otherwise without such a perspective. This viewpoint can be worthwhile for evaluating the benefits and the costs of early education and intervention programs for infants and young children (e.g., Hyson, Hirsh-Pasek, & Rescorla, 1990) and for children with special needs (e.g., Goodman, 1992).

The Ontogeny of Evolved Psychological Mechanisms

As we mentioned earlier, foremost in evolutionary psychology is the idea that psychological mechanisms underlie important social and intellectual behaviors and that these mechanisms have evolved (Buss, 1995; Tooby & Cosmides, 1992). These are domain-specific, modular-like mechanisms that evolved in the environment of evolutionary adaptedness, when our ancestors survived as hunters and gatherers, and may not be associated with greater reproductive fitness today.

It would be extreme to claim, of course, that all adaptive behaviors or thought processes have been explicitly selected for their fitness value; some may have been associated with another adaptive trait (byproduct) and not selected for themselves, and others may simply have not been sufficiently maladaptive to
result in extinction. But a core assumption of evolutionary psychology is that psychological mechanisms evolved to solve specific problems and are modular in nature. They also did not evolve to deal with the problems of contemporary humans; our species has only recently abandoned a nomadic lifestyle for one of villages, towns, and cities. Rather, these mechanisms evolved over the past several million years to handle the problems faced by our hominid ancestors.

An important point here is that evolved mechanisms themselves develop. Evolved epigenetic programs are expressed by means of interaction with the child’s physical and social environment. Because of the commonalities of human environments throughout the world and across time, many aspects of the human mind and behavior will develop in a species-typical way. Yet, these programs also reveal a substantial degree of flexibility, which permits individuals to adapt to the specific features of their environments. For example, children acquire language over the course of 4 or 5 years. For adults, learning a second language is often very difficult, and the ease with which children learn a first language seems at odds with (i.e., independent of) their other more general cognitive abilities. A number of specific evolved psychological mechanisms have been proposed to explain children’s acquisition of language (see Pinker, 1994), although other evolutionary-friendly proposals that posit a domain-general mechanism have also been suggested (see Elman et al., 1996).

Similarly, aspects of children’s understanding of social functioning has been hypothesized to be modular in nature (e.g., Baron-Cohen, 1995; Leslie, 1994). For example, by age 4, most children understand that other people have beliefs and desires, sometimes different from their own, that motivate their behavior. This knowledge that peoples’ behavior is motivated by their beliefs and desires (belief-desire reasoning; Wellman, 1990) has been referred to as a theory of mind, and it is difficult to imagine how any person could survive in human culture without such a theory. Being able to think about others’ thoughts is crucial to detecting deception and other social strategies that might handicap individuals. Although social intelligence, broadly defined, continues to develop into adulthood, most children by the age of 4 have developed a belief-desire theory of mind. Most children much younger than 4 years of age, however, seem to lack the requisite knowledge or conceptual ability characteristic of belief-desire reasoning.

Theory of mind is illustrated by false-belief tasks. In the standard false-belief task (e.g., Wimmer & Perner, 1983), children watch as a treat is hidden in a specific location (in a box, for example). Another person (Maxi) is present when the treat is hidden but then leaves the room, at which time the treat is moved to a new location. Children are then asked where Maxi will look for the treat when he returns. Most 4-year-old children can solve the problem, stating that Maxi will look where the treat was originally hidden, whereas most younger children state that Maxi will look for the treat in the new hiding place, apparently not realizing that Maxi’s knowledge is different from their own.

Having a belief-desire theory of mind is required for everyday exchanges of resources between two people. For instance, in research by Peskin (1992), 3-year-old children play a game with “mean monkey,” who always wants the toy that the child wants most. When children are asked to tell “mean monkey” which of several toys they really want and which one they really don’t want, “mean monkey” (a hand puppet controlled by the experimenter) always takes the most desired toy, leaving the child with the least desired one. Four-year-old children catch on very quickly to the trick to deceive “mean monkey” by pretending that the least-wanted toy is really their favorite, thus foiling “mean monkey’s” evil plan. Most 3-year-olds, in contrast, never catch on and spend the entire game being honest with “mean monkey” and never getting the toys they most desire. They fail either to monitor their own thinking or to realize that “mean monkey” has a different goal in mind than they do.

Some have argued that primate intelligence evolved in response to detecting others’ cheating and cooperation (e.g., Humphrey, 1976), but a fully developed theory of mind, based on belief-desire reasoning, is found only in Homo sapiens. Although primatologists have observed monkeys and apes engaging in tactical deception, reflecting a suite of advanced cognitive abilities (see Whiten & Byrne, 1988), such deception does not necessarily require the ability to read the mind of another individual (see Bjorklund & Kipp, in press). For example, using nonverbal false-belief tasks, Call and Tomasello (1999) found no evidence of belief-desire reasoning, comparable to that of a human 4-year-old, for chimpanzees and orangutans. In other research, Povinelli and Eddy (1996) demonstrated that chimpanzees do not understand “seeing.” In their experiments, chimpanzees were just as likely to request food from a naive observer or one who was blindfolded as they were from an observer who knew or could see the location of the desired treat. Thus, although deception is an important social skill, it does not necessarily imply a highly developed theory of mind. Humans obviously evolved a theory of mind since our species last shared a common ancestor with chimpanzees, and researchers have speculated how other cognitive abilities, including language (e.g.,
Smith, 1998) and cognitive inhibition (Bjorklund & Kipp, in press), might have co-evolved, or been pre-requisite for, this uniquely human ability.

Consistent with an evolutionary developmental psychological perspective, research has indicated that this ability may be composed of a small set of modular-like skills. For example, Baron-Cohen (1995) has proposed four separate, interacting modules involved in mindreading that develop over infancy and early childhood. The earliest developing module is the Intentionality Detector (ID), which interprets moving objects as having some volition or intention. For example, an object that is moving toward an individual may be perceived as an agent with some intention toward that individual (for instance, it wishes to harm me, to be near me). This is a very primitive skill, likely possessed by all animals with a nervous system. The second module is the Eye-Direction Detector (EDD), which has three related functions: It detects the presence of eyes or eye-like stimuli, determines whether the eyes are looking toward it or toward something else, and infers that if an organism’s eyes are looking at something then that organism sees that thing. In other words, this module is responsible for our belief that knowledge is gained through the eyes (both ours and the eyes of others). According to Baron-Cohen, these first two modules develop between birth and 9 months of age. The third module is the Shared-Attention Mechanisms (SAM). Whereas the ID and EDD involve only two objects/individuals (that is, dyadic interactions/representations), the SAM involves triadic interactions/representations. For example, if person A is looking at object B, and person C can see the eyes of person A and can see object B, person C can come to the conclusion that “You (person A) and I (person C) are looking at the same thing.” This module develops between 9 and 18 months. Finally, the Theory-Of-Mind Module (TOMM) is roughly equivalent to the belief-desire reasoning described earlier and is reflected by passing false-belief tasks. This module develops between the ages of about 18 to 48 months.

Possessing a theory of mind is central to any understanding of what it means to be human; and although monkeys and apes seem not to have a human-like theory of mind, social primates do possess the rudiments of an understanding of other conspecifics as social beings, and these animals serve as models for what the mind of our hominid ancestors may have been like (see Byrne & Whiten, 1988; Russon, Bard, & Parker, 1996). Moreover, researchers have used models similar to those of Baron-Cohen (1995) described above to explain primate behavior (e.g., Hauser & Carey, 1998; Tomasello & Call, 1997) in an attempt not only to understand the mind of primates but also to get a glimpse at the evolution of the human mind.

Evidence for the modularity of the various components of Baron-Cohen’s model comes from studies of children with autism. Baron-Cohen (1995) reviewed research from his laboratory and those of other scientists suggesting that the more advanced forms of mindreading (SAM and TOMM) are typically absent in children with autism. Autistic children (and later adults) often seem to be in a world of their own and have a difficult time in most forms of social interaction. Baron-Cohen claims that the primary deficit of these children is an inability to read minds, or what he calls mindblindness. Evidence for this conclusion comes from studies in which autistic children are presented with false-belief and other theory-of-mind tasks and consistently fail them, despite performing well on other, nonsocial tasks (e.g., Baron-Cohen, 1989; Baron-Cohen, Leslie, & Frith, 1985; Perner, Frith, Leslie, & Leekam, 1989). This is in contrast to children with mental retardation, such as Down syndrome, who perform theory-of-mind tasks easily, despite often doing poorly on other tasks that assess more general intelligence (e.g., Baron-Cohen et al., 1985). Most autistic children are able to perform well on the simpler tasks requiring the ID or EDD modules, but fail tasks involving the SAM and especially the TOMM modules. According to Baron-Cohen, autistic children are unable to understand other people’s different beliefs, even those children who are functioning at a relatively high intellectual level.

**PARENTAL INVESTMENT: EVOLUTIONARY EFFECTS ON CHILDMANAGEMENT**

When thinking of evolutionary (i.e., selective) influences on infancy and childhood, one naturally thinks of direct genetic effects. What characteristics of children’s behavior have been selected to promote their survival? There are, however, important factors external to children that may also influence their survival and reproductive success and that have also been influenced by a long history of natural selection. More specifically, we refer to the quantity and quality of parenting, or parental investment, that children receive.

Within evolutionary psychology, the concept of parental investment (Trivers, 1972) has been used primarily to explain differences in behaviors related to mating and parenting among men and women (see Bjorklund & Shackelford, 1999). Because ancestral men and women faced different adaptive problems surrounding the amount of time, effort, and resources required to rear an offspring to maturity, they evolved different adaptive mechanisms. In mammals, fertili-
zation and gestation occur within the female, and after birth, mothers provide the primary nutritional support for their offspring until they are weaned. In contrast, the male's investment in the next generation may be as little as the sperm he contributes. For a slow-developing species such as *Homo sapiens*, however, paternal investment, in the form of providing food and protection for the offspring and mother as well as child care, increases the likelihood that a man's offspring will survive and attain relatively high status in the social group (see Geary, 1998). To the extent that parenting influences children's behavior and development (see Collins, Maccoby, Steinberg, Hetherington, & Bornstein, 2000), aspects of parental investment theory can and have been applied to child development.

There is no doubt that the presence and investment of parents, particularly in high-stressed environments, is crucial to a child's survival and eventual social status. For example, Geary (1998) summarized research from traditional societies, as well as historical data from Western cultures, indicating that father absence is associated with higher childhood mortality and, for those children reaching adulthood, lower social status than for children who have a father present. The death rate is even greater when a mother is absent. What are the factors that contribute to parents investing their time and resources in a child? How might factors in the home environment influence the reproductive strategies of the children as they grow up? Are there evolutionarily sound principles to predict under what conditions children will be neglected, abused, and even killed by a parent (see Daly & Wilson, 1988)?

In light of the diverse social ecological niches that individuals inhabit, that successful adaptation depends on the ability to choose from a variety of alternative strategies is not surprising. Most basically, childrearing involves a balance between the caregivers and the offspring. Human newborns, of course, are helpless, and caregivers must invest heavily in infants to maximize their survival. In terms of a cost–benefit ratio, this can be expressed as high costs (e.g., providing food, protection, and thermoregulatory support) and high benefits (nurturing the survival of one's progeny) to caregivers and low cost and high benefits to infants. Of course this ratio changes with development, with benefits to children decreasing with increasing age.

One aspect of parent–child relationships that has important consequences for survival is attachment. Bowlby (1969) integrated Freudian and ethological concepts of attachment and proposed that mother–infant attachment is a human universal that evolved to increase the likelihood of survival. Fernald (1992) has even speculated that the infant-directed speech that parents around the world use when speaking to their babies evolved out of the attachment relationship. Infant-directed speech regulates infants’ emotions, behavior, and attention and also conveys a mother’s own emotional state to her infant, all factors important to establishing an attachment relationship.

Although all infants become attached, the quality of those attachment relations varies. Typically, securely attached infants are viewed as being better adjusted, both in infancy and in later childhood, than insecurely attached infants. Although such a characterization may have some validity from the perspective of mainstream Western society, differences in the quality of attachment may reflect different adaptive solutions to different physical and social environments, and insecure attachments, for example, should not automatically be viewed as less optimal than secure attachments. For instance, children reared in homes characterized by inadequate resources, high stress, marital discord/father absence, and harsh and inconsistent childcare reach puberty early, form short-term and unstable pair bonds, and invest relatively little in their own offspring (e.g., Belsky, Steinberg, & Draper, 1991; Chisholm, 1999); male children tend to be noncompliant and aggressive (Draper & Harpending, 1987). In stressful and uncertain environments, there is a tendency to invest more in mating (for both sexes) than in parenting. In contrast, children from home environments characterized by adequate resources and spousal harmony/father present mature later, postpone sexual activity, and show greater investment in the fewer number of children they produce (e.g., Belsky et al., 1991; Graber, Brooks-Gunn, & Warren, 1995; Kim, Smith, & Palermhi, 1997; Moffitt, Caspi, Belsky, & Silva, 1992; Surbey, 1998). Thus, depending on the availability of resources, which is related to paternal investment and spousal harmony, different patterns of socialization occur that result in differential investment in the next generation.

Research examining the effects of environmental conditions on reproductive maturity generally report a greater effect for females than for males (e.g., Kim et al., 1997). This sex difference makes sense, given the differential investment in offspring by males and females. Because females’ investment in any conception is greater than males’, they should be more sensitive to environmental factors that may affect the rearing of offspring (such as malnutrition, stress, lack of resources) than males (Surbey, 1998).

As children grow, they are less dependent on mothers for their basic needs; thus conflicts between mothers’ and children’s interests surface, usually at the time of weaning (Hinde, 1987). Caregivers must
balance the costs associated with providing protection, food, and guidance to their offspring with the resources needed for their own survival and future reproductive needs. Consistent with this argument, caregivers would expend more resources on only/last born children. In certain extreme cases (e.g., where caregivers’ resources are limited or where the potential for offspring survival is low) infanticide can result (Daly & Wilson, 1984). Fathers’ investment in offspring often varies with the degree of paternal certainty (e.g., Daly & Wilson, 1988). These environmental variations and their effects on parents, in turn, translate into differential treatment, and outcomes, for different children in the same family.

Other individual differences are associated with children’s relationships with their parents, and these differences may be related to a specific dimension of the affectional system, “warmth.” Warmth has been conceptualized as a reward system, distinct from the attachment system, that may have evolved to promote cohesive family relationships and parental investment in their children (MacDonald, 1992). Individual differences in the warmth system may underlie parent–child relationships and subsequent personality. Specifically, the affectional system of which warmth is a component may have evolved in such a way as to shape our motivation to engage in certain behaviors (e.g., opioid systems underlie the emotions of social support and separation; Panksepp, cited in MacDonald, 1992). This reward system may provide the basis for parents to invest (by providing warmth) in the prolonged care of their offspring.

Individual differences in the amount and quality of investment parents provide for their children, as well as other important aspects of children’s social and physical environment, can be addressed in terms of evolutionary developmental psychology. Placing such emphasis on “environmental” factors may, upon initial inspection, seem at odds with a theory based on the expression of evolved, genetically based, epigenetic programs over the course of ontogeny. But to the contrary, evolutionary developmental psychology has much to say about the conditions in which children are reared and the consequences of their rearing environment on their later development.

The effects that parents have on the personality development and socialization of their children is complicated and not always direct (see Collins et al., 2000). In fact, other theorists taking an evolutionary perspective have suggested that forces outside of the family exert a far greater role on children’s socialization than had previously been believed (e.g., Harris, 1995; Scarr, 1992). For example, Scarr (1992) proposed that “super parenting” is not necessary to rear a successful child. Rather, children can tolerate a wide range of parenting styles and still grow up to be successful (i.e., reproductive) adults. Scarr proposed that patterns of child development are robust to variations in parenting, with children seeking environments that are compatible with their genotype, and it is these genotype-compatible environments that are chiefly responsible for shaping children’s behaviors and minds.

There is no single evolutionary account for the role of parents and other cultural agents on the socialization of children. Taking an evolutionary developmental perspective can, however, provide insight for understanding the different ways parents treat their children; it can also help identify and illuminate alternative strategies that children and adolescents use to deal with adaptive problems (e.g., mating). For example, viewing early physical maturation and sexual activity by some teens as an adaptive reproductive strategy in response to stressful and uncertain environments may cause policymakers to see the problem of teenage pregnancy in a different light and propose different alternatives for its solution.

DEVELOPMENTAL ANTECEDENTS OF ADULT SEX DIFFERENCES

Evolutionary psychologists have understandably been interested in sex differences in adults. In particular, evolutionary social psychologists have focused on sex differences in reproductive strategies, most as they relate to parental investment theory (e.g., Buss, 1989; Shackelford & Larsen, 1997). Sex differences have also been a favorite topic of developmental psychologists. Although some cognitive sex differences are now typically attributed to an interaction of biological and social factors (e.g., Casey, 1996), differences in social behavior between boys and girls are most typically attributed to the adoption of culturally imposed gender roles (e.g., Eagly, 1987). Although one’s culture, a proximal mechanism, undeniably exerts a profound effect on one’s gender-specific behaviors and roles, evolutionary psychology proposes that males and females have evolved different “strategies” relating to mating and childrearing and that these different evolved strategies, or distal mechanisms, underlie sex differences in associated behaviors across all human cultures (e.g., Bjorklund & Shackelford, 1999; Geary, 1998). This, of course, does not imply that adult sex differences arise fully formed but rather that they emerge over the course of development and follow the precepts of the developmental systems approach discussed earlier.

From a developmental perspective, many behaviors that reflect sex differences between adults should

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have their origins in childhood. Thus, differences in
the social behaviors between boys and girls may reflect
preparations for important reproductively related be-
haviors observed in adulthood. Although we have
emphasized earlier that many adaptive characteristics
of infancy and childhood are selected for this time
in development only and are not (necessarily) prepa-
rations for later life, other aspects of childhood do
serve to prepare the way for adulthood, of which sex
differences in social and cognitive abilities are good
examples.

Adult sex differences should be found in mating
strategies, in the degree males and females invest in
the well-being of their offspring, and in intrasexual
competition (see Geary, 1998, 1999). Following the
tenets of parental investment theory (Trivers, 1972),
women, because of the greater potential investment
they have in any potential copulation (i.e., pregnancy
and the principal job of nurturing the resulting child),
should adopt a more conservative mating strategy
than men. They should also be more oriented toward
childcare. With regard to intrasexual competition,
men in all cultures compete with one another for con-
trol of resources (e.g., money or cattle) and attainment
of social status. Such competition often involves
physical contests and often results in injury or death
(e.g., Cairns & Cairns, 1994; Daly & Wilson, 1988).

Of course, females also compete with one another
for mates. Our knowledge, however, of the ways in
which females accomplish this goal is extremely lim-
ited in both the human and animal literatures. Ethol-
ologists who have studied this (Gowaty, 1992; Smuts,
1985, 1995) have found that female primates use alli-
cances with conspecifics for both defense against un-
wanted sexual overtures and access to desired males.
In gaining access to males, females often compete,
through alliances and deception, with other females
as well. We also know that human females use differ-
ent forms of aggression than males, specifically “re-
tional aggression” (Crick & Bigbee, 1998), which in-
volves gossiping, backbiting, and shunning other
women, the goal of which appears to be to disrupt the
social networks of their competitors. In short, and con-
sistent with Darwin’s original formulations, there is
both within- and between-sex competition for mates.

From this view, it is important to explore further fe-
male’s use of “relational aggression” or aggression
used in the service of social relations. Knowing the
goal of within- and between-sex relational aggression
would be helpful. That is, relational aggression is
used to manipulate social relations, but we do not
know what these relationships are the vehicle for. Is it
used by preschool girls against both boys and girls to
gain access to favored resources, similar to the way
preschool boys use physical aggression? Is it used in
adolescence against other girls in the service of gain-
ing access to potential mates?

Competition and Aggression

Although females compete with one another and
use aggression, the intensity of that competition is not
as fierce as it traditionally has been for males and
rarely leads to serious physical injury or death. This
pattern of sex differences is particularly critical in a
species, such as humans, that is marginally polyga-
mous, with some males being able to monopolize
more than one female and other males having access
to no females or only to less desirable females (i.e.,
those with low reproductive value). Most mamma-
lian females will find a mate, even if not a highly de-
sirable one; in contrast, the fitness variance is larger
for mammalian males, with many males being totally
excluded from mating. As a result, selection favored a
male psychology in which competitive risk taking
was favored (Daly & Wilson, 1988; Wilson & Daly,
1985). Such risk taking, and the violence that can ac-
company it, is universal and peaks when males are
entering the reproductive market, which in humans is
in adolescence (Cairns & Cairns, 1994; Daly & Wilson,
1988).

Risk taking and accidents are frequently the result
of competitive or “show-off” (display) behaviors,
with the purpose being to compete with other mem-
bers of the same sex or to impress members of the op-
posite sex. Data from the United States indicate that
death from accidents and injuries resulting from vio-
lence are higher in males than females and rise rap-
 idly for males in the late teens and continue to in-
crease into the mid-20s before declining (see Cairns &
Cairns, 1994; Daly & Wilson, 1990). Similar patterns
are observed both for being the victim and the perpe-
trator of homicide (Cairns & Cairns, 1994; Daly & Wil-
son, 1988; Wilson & Daly, 1985).

Despite the societal penalties and presumed mal-
adaptiveness of much of this behavior in contempo-
rary culture, human males have inherited a psychol-
ogy that was adapted to different conditions in which
risky competition during adolescence and young
adulthood, on the average, resulted in increased in-
clusive fitness. Such behaviors are not, of course,
“programmed” or “inevitable” but rather are shaped
by experience over development and are more likely
to be expressed in some environments than others.
For example, when a young male has limited access
to important cultural resources and when life expect-
ancy is low, competing vigorously for mates and
what resources one can attain makes more sense than

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taking a more cautious, long-term approach. Under such conditions, which typify impoverished communities in affluent nations, males can be expected to engage in elevated levels of risk taking and violence against other males. This is exactly the pattern one sees in the United States for homicide rates of African American males (see Cairns & Cairns, 1994). The age pattern is similar to that of Whites, but the absolute rate is higher and is associated with reduced access to educational and economic opportunities for many inner-city African American males in comparison with Whites.

Judging Ideal Mates

One interesting sex difference that is apparent in adolescence is concerned with sexual attractiveness. In all cultures, women (including teenage girls) state that the ideal mate is someone several years older than they are (Buss, 1989; Kenrick & Keefe, 1992), and this corresponds to actual marriage practices (Kenrick & Keefe, 1992). Similarly, males in all cultures state that the ideal mate is someone several years younger than themselves, and the age discrepancy in an ideal mate actually increases as men age (i.e., older men prefer increasingly younger women, whereas women’s preferences shown no such change; Kenrick & Keefe, 1992). Males’ preference for younger mates has been interpreted as reflecting an evolved psychological mechanism for recognizing reproductive value. Reproductive value, the number of children a woman can potentially have in a lifetime, cannot be measured directly but can be inferred from other characteristics, and age is perhaps the best single predictor. Thus, older men’s ideal mate is not someone just a few years younger than themselves but someone who has high reproductive value. The only group not to show this pattern is adolescent boys. Rather, teenage males’ ideal mate is a woman several years older than themselves (Kenrick, Keefe, Gabrielidis, & Cornelius, 1996). According to Kenrick and his colleagues (1996), the reason for this anomaly is that adolescent males are making their decision on the basis of physical cues of reproductive value and not age, per se. Women in their late teens and early 20s are the most fertile and thus are selected by adolescent males as most desirable, despite the fact that such women express no interest in dating younger males (Kenrick et al., 1996).

Play as Preparation for Adulthood

Precursors to adult sex differences are readily found in childhood. Perhaps the most obvious differences are observed in the ways in which boys and girls segregate themselves. This segregation has implications for the ways in which children interact and play. For example, as early as 3 years of age, boys engage in more rigorous rough-and-tumble play, particularly in situations not monitored by adults (e.g., see Pellegrini & Smith, 1998). In fact, there is some suggestion that girls actively avoid contact with boys because of their roughness (e.g., Haskett, 1971), thus contributing to the universal formation of the same-sex play groups that dominate the early school years (e.g., Edwards & Whiting, 1988). Segregation in play groups and males’ play being rougher than females are also typical of nonhuman primate play (Biben, 1998). Males’ greater propensity toward rough-and-tumble play has been associated with prenatal exposure to male hormones (Collaer & Hines, 1995).

The most common preparatory function proposed for rough-and-tumble play in the animal literature relates to fighting and hunting in males (Biben, 1998; Smith, 1982). This argument is based on the similarity in design features; for example, both playing and fighting involve hitting movements. In humans, rough-and-tumble play mirrors the activities associated with male–male competition (i.e., primitive warfare) in hunter-gatherer societies (Keeley, 1996). Further, experiencing both superordinate and subordinate role characteristics of rough-and-tumble play probably relates to social competence. Evidence from nonhuman primates, for example, suggests that juvenile squirrel monkeys, Saimiri sciureus, deprived of opportunities to engage in play fighting where they are in superordinate (pinner) and subordinate (being pinned) roles, are later bullies and “sissies,” respectively (Biben, 1989). Thus, although boys’ rough-and-tumble play may have some immediate benefits, such as establishing social hierarchies and facilitating skeletal and muscle development, it also appears to teach boys something about aggression, fighting, and social competition. Further, by engaging in the role alternation characteristic of playfighting, boys are gaining experience in superordinate and subordinate roles (Biben, 1998), something that is useful in competitive interactions of all sorts but especially useful in their encounters with other males on matters of dominance and eventual mating choices.

Girls’ play is also influenced by matters associated with fitness and mating but in different ways. Girls engage in more play parenting (i.e., doll play) than boys, a sex difference that is found even in some primates (Pryce, 1995). Further, there is a relative absence of dominance-related themes in the play of human and nonhuman female primates (Biben, 1998). That is, females’ play is less often centered around roles where physically based dominance relationships are publicly exhibited. This sex differences has been viewed
as an evolved tendency that relates to the fact that females take primary responsibility for parenting their offspring (e.g., Biben, 1998; Geary, 1998).

Sex Differences in Inhibition

Childhood sex differences are also found for some forms of behavioral and social inhibition that may be related to mating and childcare strategies. For example, Bjorklund and Kipp (1996) proposed that, because of the greater potential investment women have in any sexual encounter, it would be in their best interest to have greater inhibitory control of sexual and social behaviors relative to men. Thus, compared to men, women should be better at hiding their true emotions (so as not to reveal prematurely an interest in a potential mate). In a literature review, Bjorklund and Kipp (1996) reported that females displayed greater inhibitory abilities on tasks potentially related to mating strategies, such as concealing emotions. (This is true despite greater female emotional expression.) When sex differences were found consistently in a domain, they were found for children as well as for adults. For example, in research in which people are to display a positive emotion after a negative experience (for example, pretending that a foul-tasting drink tastes good) or vice versa, females from the age of 4 years are better able to control their emotional expressions (that is, fool a judge watching their reactions) than are males (e.g., Cole, 1986; Saarni, 1984).

Bjorklund and Kipp (1996) also reported sex differences in inhibition abilities, favoring females, on tasks requiring delay of gratification and resisting temptation, again at all ages tested (e.g., Kochanska, Murray, Jacques, Koenig, & Vanderveest, 1996; Slaby & Park, 1971). These differences may relate to the greater inhibition skills that women need as principal caregivers for their children. Effective parents must put the needs of their infants first, delay their own gratification, resist distractions that would take them away from their infants, and inhibit many aggressive “reflex” responses to an often difficult and aversive infant. The pattern of sex differences in inhibition abilities found in both children and adults is consistent with the pattern that one would predict if pressures associated with taking care of young children were greater on hominid females than males (see Bjorklund & Kipp, 1996). No consistent sex differences were found, at any age, for tasks assessing cognitive inhibition, which suggests that the sex differences that are observed are relatively domain-specific in nature and relate to the different mating and childcare strategies of ancient men and women.

An evolutionary account of sex differences, either in adulthood or childhood, does not minimize the contribution of culture in affecting the roles that men and women adopt. Rather, the proposal here is that adult sex differences, in all cultures, are built upon evolved, epigenetic programs, based on the differential self-interest of ancestral men and women. Moreover, these abilities develop, with differences observed in adulthood being influenced by experiences over the juvenile period.

Evolutionary theory provides a reason for assessing sex differences on a wide range of social and cognitive tasks. Evaluating sex differences in our studies for their own sake rarely seemed worthwhile. But having an overarching theory that proposes that males and females have evolved different strategies for maximizing their inclusive fitness and that these strategies develop in interaction with a child’s social and physical environment affords a motivation for thinking that, sometimes, sex differences are something substantially more than error variance.

EVOLUTIONARY DEVELOPMENTAL PSYCHOLOGY AND CONTEMPORARY CULTURE

Despite the many differences of lifestyle between contemporary humans and their Pleistocene ancestors, there has been too little time for evolved psychological mechanisms to have changed since the advent of civilization 10,000 to 12,000 years ago. As a result, mechanisms evolved to adapt ancient humans to their environments may not always be beneficial to modern people.

This insight is relevant to formal educational practices. Given that the modern human mind evolved to solve problems faced by small groups of nomadic hunters and gatherers, it is no wonder that many children balk at attending school. From the perspective of evolutionary psychology, much of what we teach children in school is “unnatural” in that teaching involves tasks never encountered by our ancestors (e.g., Jensen et al., 1997; Pellegrini & Bjorklund, 1997). For example, although our species has apparently been using language for tens of thousands of years, reading is a skill that goes back only a few thousands of years, and it is only in this century that a majority of people on the planet are literate. Geary (1995) has referred to cognitive abilities that were selected in evolution, such as language, as biologically primary abilities and to skills that build upon these primary abilities but that are principally cultural inventions, such are reading, as biologically secondary abilities. Biologically primary abilities are acquired universally and children typically have high motivation to perform tasks involving them.

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Biologically secondary abilities, on the other hand, are culturally determined, and often tedious repetition and external motivation are necessary for their mastery. It is little wonder that reading, a supposed “language art,” and higher mathematics give many children substantial difficulty.

On a related issue, Jensen and his colleagues (1997) have proposed that a common childhood disorder that impacts formal schooling, attention-deficit/hyperactivity disorder (ADHD), may, in fact, reflect an adaptational problem, for at least some afflicted children. Impulsivity, rapid scanning, and hyperactivity may have been advantageous traits to early Homo sapiens. For example, high levels of motor activity may have served (and still do) to gain information about the immediate environment, which can be of benefit to foraging, anticipating dangers, and spotting new opportunities. Rapid scanning, as opposed to the highly focused scanning useful in modern schools, may have served to monitor threats and changing environmental conditions, particularly in stressful or highly varied environments. And quick responses without the benefit of reflection (impulsivity) may have been favored when the likelihood of a delayed response would have resulted in losing food or becoming the victim of a predator. Jensen et al. (1997) proposed that the relatively high incidence of ADHD today (3% to 5%) suggests that it has been maintained by natural selection. Rather than all cases of ADHD being a “disorder,” many cases may reflect normal variation in a suite of cognitive/behavioral characteristics or developed responses to early environmental conditions (e.g., high-threat or highly novel environments yielding rapid scanning). Modern schools, with their emphasis on highly focused instruction, provide a poor fit to what were once adaptive evolved mechanisms. Similarly, Panksepp (1998) and Pellegrini and Horvat (1995) have suggested that most children diagnosed with ADHD may simply be highly active and playful youngsters who have a difficult time adjusting to the demands of school. The widespread use of psychostimulant drugs to reduce the hyperactivity and increase the attentional focusing of children with ADHD may reduce the desire and opportunity to play, which may, in turn, reduce neural and behavioral plasticity.

An evolutionary perspective to developmental psychology may also provide insights into some contemporary social issues, such as male-on-male violence during adolescence and young adulthood (e.g., Daly & Wilson, 1988), teenage pregnancy (e.g., Weisfeld & Billings, 1988), the effects of different parenting styles on later behavior (e.g., Belsky et al., 1991), parent–child conflict (e.g., Surbey, 1998; Trivers, 1974), sibling rivalry (Solloway, 1996), changing patterns of social dominance over childhood (Hawley, 1999), and child abuse (e.g., Daly & Wilson, 1996), among others. For example, cases of child abuse and child homicide are much more frequent in stepfamilies, with the abuse often perpetrated by the stepfather (see Daly & Wilson, 1988, 1996). In fact, Daly and Wilson (1996, p. 79) state that the “step relationship itself is the single most important risk factor for severe child maltreatment yet discovered.” Because stepparents have no genetic investment in their stepchildren, from a strictly inclusive-fitness perspective, stepparents should seek to invest few of their resources on their stepchildren. In many animal species, males will kill the offspring of a new mate, thereby bringing the female into estrus sooner and eliminating the investment of resources he would have had to devote to his mate’s offspring from a previous male. Humans, in fact, are exceptional in the nurturing that stepparents do provide for stepchildren. Yet, differential patterns of child abuse and expressed motivations for child homicides between genetic parents and stepparents suggest that much of the violence against children is rooted in ancient evolved adaptations, and knowing this can result in societal solutions to a pervasive problem.

CONCLUSION

An evolutionary perspective provides a common ground for interpreting all aspects of human behavior—social, emotional, cognitive—and may serve to integrate the often disparate subfields of psychology. As developmental psychologists, we have long believed that the best way to understand any aspect of human functioning is to look at its ontogeny. But developmental psychology has been as fractionated as its parent discipline. Many developmental scientists often talk past one another because they fail to share a common view of what is important about development (see Bjorklund, 1997b). Evolutionary psychology, we believe, provides a metatheory for developmentalists assessing a wide range of topics and ages (Baltes, 1997; Bjorklund, 1997b; Fishbein, 1976). As evolutionary theory is the foundation for modern biology, we believe that it needs to be the foundation for modern psychology (see Daly & Wilson, 1988; Tooby & Cosmides, 1992; Wilson, 1998).

We also believe that an explicitly developmental perspective can have a positive influence on the field of evolutionary psychology. Much of evolutionary psychology has been concerned with the natural selection of “mature” behaviors. Given this perspective, it is easy to see why some evolutionary psychologists have not looked at child development for interesting phenomena. Evolution proceeds when successful in-
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dividuals reproduce. These are the most progressed members of the species, and factors that promote their reproduction obviously characterize adulthood and not infancy and childhood.

We must admit that, on the surface, this seems to be a reasonable argument, and, quite obviously, much of what does contribute to individual success at reproduction, both today and in our evolutionary past, is found in the adult. But our ancestors also developed, and before organisms can reproduce to get their genes into the next generation, they must first reach adulthood. For a slow-developing species such as humans, that can be a long and treacherous path. How people develop is important to eventual reproductive success, and, as we have noted previously, we have every reason to believe that evolution has worked to select characteristics of infancy and childhood that are adaptive to surviving to adulthood, just as it has worked to make adults responsive to the appropriate social and sexual cues that are so important in getting one's genes into the next generation. Moreover, important characteristics of adulthood, such as different “sexual strategies” of men and women, should not be seen as preformed, springing into existence with the first blast of pubertal hormones. Rather, even these characteristics have a developmental history, which can alter the expected course of adult behavior. We believe that an evolutionary perspective is important for a new science of developmental psychology.

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