Infant and Child Development: From Conception
Through Late Childhood

Infant and Child Development

From Conception Through Late Childhood

An Open Educational Resources Publication

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Acknowledgements, Resources, and Feedback

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Resources

Powerpoint slides and a populated online testbank which allows for question sharing can be obtained by contacting either Professor Maria Pagano at mpagano@citytech.cuny.edu or Professor Marie Parnes at mparnes@citytech.cuny.edu

Feedback

See something wrong, or would you like to add something? Feedback is not only welcome but encouraged by both faculty and students. Please send any questions or comments you might have to either mpagano@citytech.cuny.edu or mparnes@citytech.cuny.edu

Cover Artwork

Very special thanks to Esther Maggie Hoar (EM) who created the artwork for the cover.

1. Introduction to Infant and Child Development

Learning Objectives

After reading Chapter 1, you should be better equipped to:

- Describe the principles that underlie development.
- Differentiate periods of human development
- Understand the theoretical questions posed by developmental psychologists.
- Explain the concept of a theory.
- Compare and contrast different theories of child development.

Why Study Infants and Children from a Psychological Perspective?

From the perspective of a parent, seeing your child develop can be both rewarding and challenging. Hearing your child say his or her

first word, or watching your child take their first steps are memories a parent will never forget. However, why should the development of infants and children be of interest from a psychological perspective? What information can be gained from such study, and how can this information be used to benefit others?[1]

Two of the key goals involved in the study of infant and child development focus on:

1. *Describing change* – many of the studies we will examine simply involve the first step in investigation, which is description. Arnold Gesell's study on infant motor skills, for example.
2. *Explaining change* – Theories provide explanations for why we change over time. For example, Erikson offers an explanation about why a two-year-old might be temperamental.

Think about how you were 5, 10, or even 15 years ago. In what ways have you changed? In what ways have you remained the same? You have probably changed physically; perhaps you have grown taller and become heavier. But you may have also experienced changes in the way you think and solve problems. [2]

Development is multidimensional and as we grow, we change across three general domains or dimensions, the physical, the cognitive, and the social/emotional.

The **physical domain** includes changes in height and weight, changes in gross and fine motor skills, sensory capabilities, the nervous system, as well as the propensity for disease and illness. The **cognitive domain** encompasses the changes in intelligence,

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wisdom, perception, problem-solving, memory, and language. The **social and emotional domain** (also referred to as psychosocial) focuses on changes in emotion, self-perception, and interpersonal relationships with families, peers, and friends.[3]

Emotional, social, and cognitive change is noticeable when we compare how 1-year-olds, 3-year-olds, and 6-year-olds think and reason. Their thoughts about others and the world are quite different. Consider play for instance. The typical 1-year-old will play alone with little interaction, whereas the 3-year-old will play alongside others, but not play together, and the 6-year-old plays cooperatively with others often with a shared goal.[4]

It is important to understand that all three domains influence each other, and that change in one domain may cascade and prompt changes in the other domains. In addition, development in each domain is characterized by plasticity, which is our ability to change and many of our characteristics are malleable. Early experiences are important, but children are remarkably resilient and able to overcome adversity.

Finally, Development is **multi-contextual**. We are influenced by both **nature** (genetics) and **nurture** (the environment) – when and where we live and our actions, beliefs, and values are a response to circumstances surrounding us, and it is important to understand that physical growth, behavior, motivation, emotion, and choice are all part of a bigger picture.[5]

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Periods of Development

Think about what periods of development that you think a course on Child Development would address. How many stages are on your list? Perhaps you have three: infancy, childhood, and teenagers. Developmentalists (those that study development) break this part of the life span into these five stages as follows:

Prenatal Development (conception through birth)
Infancy and Toddlerhood (birth through two years)
Early Childhood (3 to 5 years)
Middle Childhood (6 to 11 years)
Adolescence (12 years to adulthood)

This list reflects unique aspects of the various stages of childhood and adolescence that will be explored in this book. So while both an 8 month old and an 8 year old are considered children, they have very different motor abilities, social relationships, and cognitive skills. Their nutritional needs are different and their primary psychological concerns are also distinctive.

Prenatal Development

Conception occurs and development begins. All of the major structures of the body are forming and the health of the mother is of primary concern. Understanding nutrition, **teratogens** (or environmental factors that can lead to birth defects), and labor and delivery are primary concerns.

Infancy and Toddlerhood

The first two years of life are ones of dramatic growth and change.

A newborn, with a keen sense of hearing but very poor vision is transformed into a walking, talking toddler within a relatively short period of time. Caregivers are also transformed from someone who manages feeding and sleep schedules to a constantly moving guide and safety inspector for a mobile, energetic child.

Early Childhood

Early childhood is also referred to as the preschool years and consists of the years which follow toddlerhood and precede formal schooling. As a three to five-year-old, the child is busy learning language, is gaining a sense of self and greater workings of the physical world. This knowledge does not come quickly, however, and preschoolers may initially have interesting conceptions of size, time, space and distance such as fearing that they may go down the drain if they sit at the front of the bathtub or by demonstrating how long something will take by holding out their two index fingers several inches apart. A toddler's fierce determination to do something may give way to a four-year old's sense of guilt for action that brings the disapproval of others.

Middle Childhood

The ages of six through eleven comprise middle childhood and much of what children experience at this age is connected to their involvement in the early grades of school. Now the world becomes one of learning and testing new academic skills and by assessing one's abilities and accomplishments by making comparisons between self and others. Schools compare students and make these comparisons public through team sports, test scores, and other forms of recognition. Growth rates slow down and children are

able to refine their motor skills at this point in life. And children begin to learn about social relationships beyond the family through interaction with friends and fellow students.

Adolescence

Adolescence is a period of dramatic physical change marked by an overall physical growth spurt and sexual maturation, known as puberty. It is also a time of cognitive change as the adolescent begins to think of new possibilities and to consider abstract concepts such as love, fear, and freedom. Ironically, adolescents have a sense of invincibility that puts them at greater risk of dying from accidents or contracting sexually transmitted infections that can have lifelong consequences.[6]

Theoretical Questions in Development

Nature and Nurture

Why are you the way you are? As you consider some of your features (height, weight, personality, being diabetic, etc.), ask yourself whether these features are a result of heredity or environmental factors, or both. Chances are, you can see the ways in which both heredity and environmental factors (such as lifestyle, diet, and so

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6. Children's Development by Ana R. Leon is licensed under CC BY 4.0

on) have contributed to these features. For decades, scholars have carried on the **"nature/nurture" debate**. For any one feature, those on the side of nature would argue that heredity plays the most important role in bringing about that feature. Those on the side of nurture would argue that one's environment is most significant in shaping the way we are. This debate continues in all aspects of human development, and most scholars agree that there is a constant interplay between the two forces. It is difficult to isolate the root of any single behavior as a result solely of nature or nurture.

Continuity versus Discontinuity

Is human development best characterized as a slow, gradual process, or is it best viewed as one of more abrupt change? The answer to that question often depends on which developmental theorist you ask and what topic is being studied. The theories of Freud, Erikson, Piaget, and Kohlberg are called stage theories. Stage theories or **discontinuous development** assume that developmental change often occurs in distinct stages that are qualitatively different from each other, and in a set, universal sequence. At each stage of development, children and adults have different qualities and characteristics. Thus, stage theorists assume development is more discontinuous. Others, such as the behaviorists, Vygotsky, and information processing theorists, assume development is a more slow and gradual process known as **continuous development**. For instance, they would see the adult as not possessing new skills, but more advanced skills that were already present in some form in the child. Brain development and environmental experiences contribute to the acquisition of more developed skills.
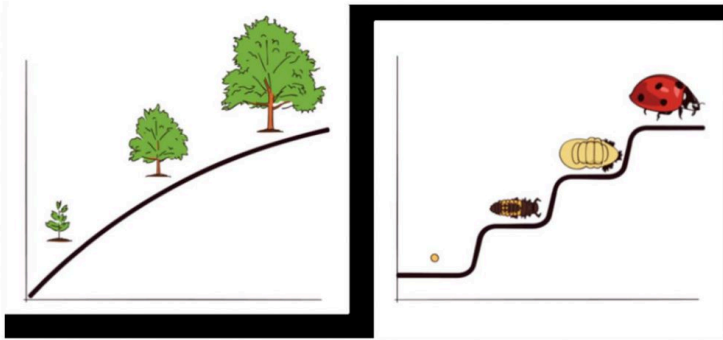
The tree represents continuous development, while the ladybug represents discontinuous/stage development.[7]

Active versus Passive

How much do you play a role in your own developmental path? Are you at the whim of your genetic inheritance or the environment that surrounds you? Some theorists see humans as playing a much more active role in their own development. Piaget, for instance believed that children actively explore their world and construct new ways of thinking to explain the things they experience. In contrast, many

7. Image by NOBA is licensed under CC BY-NC-SA 4.0

behaviorists view humans as being more passive in the developmental process.

Stability versus Change

How similar are you to how you were as a child? Were you always as out-going or reserved as you are now? Some theorists argue that the personality traits of adults are rooted in the behavioral and emotional tendencies of the infant and young child. Others disagree and believe that these initial tendencies are modified by social and cultural forces over time.

Investment in Early Childhood Development Lays the Foundation for a Prosperous and Sustainable Society[8]

The first years of life are important, because what happens in early childhood can matter for a lifetime. Science shows us what children must have, and what they need to be protected from, in order to promote their healthy development. Stable, responsive, nurturing relationships and rich learning experiences in the earliest years provide lifelong benefits for learning, behavior and both physical and mental health. In contrast, research on the biology of stress in early childhood shows how chronic stress caused by major

8. *Investment in Early Childhood Development Lays the Foundation for a Prosperous and Sustainable Society* by Jack P. Shonkoff, MD, Julius B. Richmond FAMRI Professor of Child Health and Development is found at Importance of early childhood development. In: Tremblay RE, Boivin M, Peters RDeV, eds. *Encyclopedia on Early Childhood Development* [online]. http://www.child-encyclopedia.com/sites/default/files/dossiers-complets/en/importance-of-early-childhood-development.pdf. Updated March 2011. Accessed August 1, 2020. This article is used with permission by Encyclopedia of Early Childhood Development.

adversity, such as extreme poverty, abuse or neglect, can weaken developing brain architecture and permanently set the body's stress response system on high alert, thereby increasing the risk for a range of chronic diseases.

The following basic concepts established over decades of neuroscience and behavioral research, help illustrate why healthy child development from birth to five years provides a foundation for a prosperous and sustainable society.

Brains are built over time, from the bottom up. The basic architecture of the brain is constructed through an ongoing process that begins before birth and continues into adulthood. Early experiences affect the quality of that architecture by establishing either a sturdy or a fragile foundation for the learning, health and behavior that follow. In the first few years of life, 700 new neural connections (called synapses) are formed every second. After this period of rapid proliferation, these connections are reduced through a process called pruning, so that brain circuits become more efficient. Sensory pathways, like those for basic vision and hearing, are the first to develop, followed by early language skills and later by higher cognitive functions. Connections proliferate and prune in a prescribed order, with later, more complex brain circuits built upon earlier, simpler circuits.

The interactive influences of genes and experience shape the developing brain. Scientists now know a major ingredient in this developmental process is what has been called a "serve and return" relationship between children and their parents and other caregivers in the family or community. Young children naturally reach out for interaction through babbling, facial expressions and gestures, and adults respond with similar kinds of vocalizing and gesturing back at them. In the absence of such responses – or if the responses are unreliable or inappropriate – the brain's architecture does not form as expected, which can lead to disparities in learning and behavior.

The brain's capacity for change decreases with age. It is most flexible, or "plastic," early in life to accommodate a wide range of

environments and interactions, but as the maturing brain becomes more specialized to assume more complex functions, it is less capable of reorganizing and adapting to new or unexpected challenges. For example, by the end of the first year, the parts of the brain that differentiate sounds are becoming specialized according to the language the baby has heard. At the same time, the brain is already starting to lose the ability to recognize different sounds found in other languages. Although the "windows" for complex language learning and other skills remain open, these brain circuits become increasingly difficult to alter over time. Early plasticity means it's easier and more effective to influence a baby's developing brain architecture than to rewire parts of its circuitry during adolescence and the adult years.

Cognitive, emotional, and social capacities are inextricably intertwined throughout the life course. The brain is a highly integrated organ, and its multiple functions operate in a richly coordinated fashion. Emotional well-being and social competence provide a strong foundation for emerging cognitive abilities, and together they are the bricks and mortar that make up the foundation of human development. The emotional and physical health, social skills and cognitive-linguistic capacities that emerge in the early years are all important prerequisites for success in school and, later, in the workplace and community.

Although learning how to cope with adversity is an important part of healthy child development, excessive or prolonged stress can be toxic to the developing brain. When we are threatened, our bodies activate a variety of physiological responses, including increases in heart rate, blood pressure, and stress hormones, such as cortisol. When a young child is protected by supportive relationships with adults, he learns how to adapt to everyday challenges and his stress response system returns to baseline. Scientists call this positive stress. Tolerable stress occurs when more serious difficulties, such as the loss of a loved one, a natural disaster, or a frightening injury, are buffered by caring adults who help the child adapt, thereby mitigating the potentially damaging effects of abnormal levels of

stress hormones. When strong, frequent or prolonged adverse experiences, such as extreme poverty or repeated abuse, are experienced without adult support, stress becomes toxic and disrupts developing brain circuits. Toxic stress experienced early in life can also have a cumulative toll on learning capacity as well as physical and mental health. The more adverse experiences in childhood, the greater the likelihood of developmental difficulties and other problems. Adults with more adverse experiences in early childhood are also more likely to have chronic health problems, including alcoholism, depression, heart disease and diabetes.

Early intervention can prevent the consequences of early adversity. Research shows that later interventions are likely to be less successful – and in some cases are ineffective. For example, when children who experienced extreme neglect were placed in responsive foster care families before age two, their IQs increased more substantially and their brain activity and attachment relationships were more likely to become normal than if they were placed after the age of two. While there is no "magic age" for intervention, it is clear that, in most cases, intervening as early as possible is significantly more effective than waiting.

Stable, caring relationships are essential for healthy development. Children develop in an environment of relationships that begin in the home and include extended family members, early care and education providers, and other members of the community. Studies show that toddlers who have secure, trusting relationships with their parents or non-parent caregivers experience minimal stress hormone activation when frightened by a strange event, and those who have insecure relationships experience a significant activation of the stress response system. Numerous scientific studies support the conclusion that providing supportive, responsive relationships as early in life as possible can prevent or reverse the damaging effects of toxic stress.

Conclusion

The basic principles of neuroscience indicate that providing supportive conditions for early childhood development is more effective and less costly than attempting to address the consequences of early adversity later. To this end, a balanced approach to emotional, social, cognitive and language development will best prepare all children for success in school and later in the workplace and community. For children experiencing toxic stress, specialized interventions – as early as possible – are needed to target the cause of the stress and protect the child from its consequences.

From pregnancy through early childhood, all of the environments in which children live and learn, and the quality of their relationships with adults and caregivers, have a significant impact on their cognitive, emotional and social development. A wide range of policies, including those directed toward early care and education, primary health care, child protective services, adult mental health, and family economic supports, among many others, can promote the safe, supportive environments and stable, caring relationships that children need.

Theories of Development

What is a Theory?

Students sometimes feel intimidated by **theory**; even the phrase, "Now we are going to look at some theories…" is met with blank stares and other indications that the audience is now lost. But

theories are simply an explanation of something and can be valuable tools for understanding human behavior. In fact, developmental theories offer explanations about how we develop, why we change over time and the kinds of influences that impact development.[9]

Theories help guide and interpret research findings by providing researchers with help putting together various research findings. Think of theories as a story that is used to both explain behaviors and to guide research. Each time a researcher conducts an experiment to test the validity of a theory another page is being added to the story. The instructions can help one piece together smaller parts more easily than if trial and error are used.

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Historical Theories of Development

John Locke[10] (1632-1704)

Locke, a British philosopher, refuted the idea of innate knowledge and instead proposed that children are largely shaped by their social environments, especially their education as adults teach them important knowledge. He believed that through education a child learns socialization, or what is needed to be an appropriate member of society. Locke advocated thinking of a child's mind as a **tabula rasa** or blank slate, and whatever comes into the child's mind comes from the environment. Locke emphasized that the environment is

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10. Portrait of Locke in 1697 by Godfrey Kneller. Image is public domain.

especially powerful in the child's early life because he considered the mind the most pliable then. Locke indicated that the environment exerts its effects through associations between thoughts and feelings, behavioral repetition, imitation, and rewards and punishments (Crain, 2005). Locke's ideas laid the groundwork for the behavioral perspective and subsequent learning theories of Pavlov, Skinner and Bandura.

Jean-Jacques Rousseau[11] (1712-1778)
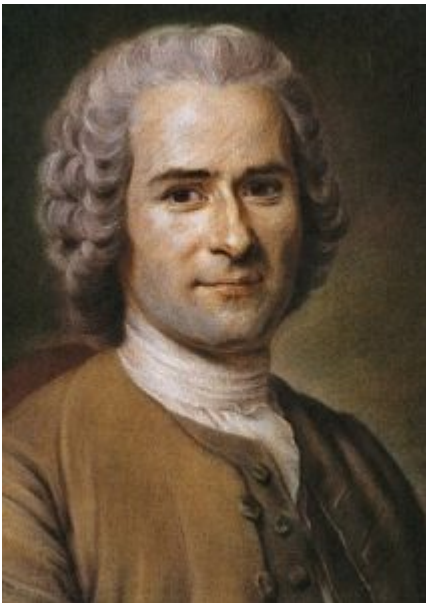
Like Locke, Rousseau also believed that children were not just little adults. However, he did not believe they were blank slates, but instead developed according to a natural plan which unfolded in different stages (Crain, 2005). He did not believe in teaching them

11. Image of Rousseau from Wikimedia Commons and is public domain

the correct way to think but believed children should be allowed to think by themselves according to their own ways and an inner, biological timetable. This focus on biological maturation resulted in Rousseau being considered the father of developmental psychology. Followers of Rousseau's developmental perspective include Gesell, Montessori, and Piaget.[12]

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Contemporary Theories of Development

Psychoanalytic Theories

Sigmund Freud (1856-1939)[13]
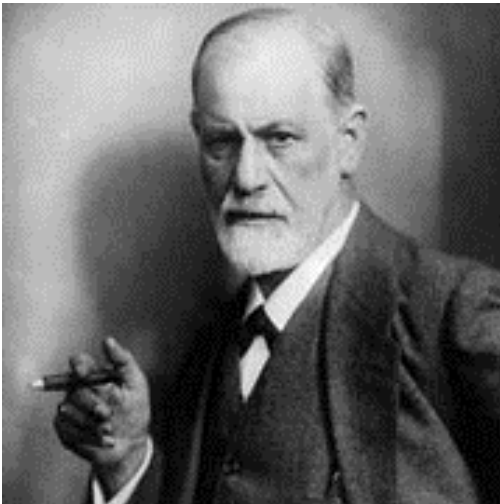
While sometimes controversial, Freud has been a very influential figure in the area of development; his view of development and psychopathology dominated the field of psychiatry until the growth of behaviorism in the 1950s. His assumptions that personality forms during the first few years of life and that the ways in which parents or other caregivers interact with children have a long-lasting impact on children's emotional states have guided parents, educators, clinicians, and policy-makers for many years. We have only recently begun to recognize that early childhood experiences do not always

13. Image of Freud is public domain

result in certain personality traits or emotional states. There is a growing body of literature addressing resiliency in children who come from harsh backgrounds and yet develop without damaging emotional scars (O'Grady and Metz, 1987). Freud has stimulated an enormous amount of research and generated many ideas. Agreeing with Freud's theory in its entirety is hardly necessary for appreciating the contribution he has made to the field of development.

Freud's Background

Sigmund Freud (1856-1939) was a Viennese M. D. who was trained in **neurology** and asked to work with patients suffering from hysteria, a conditioned marked my uncontrollable emotional outbursts, fears and anxiety that had puzzled physicians for centuries. He was also asked to work with women who suffered from physical symptoms and forms of paralysis which had no organic causes. During that time, many people believed that certain individuals were genetically inferior and thus more susceptible to mental illness. Women were thought to be genetically inferior and thus prone to illnesses such as **hysteria** (which had previously been attributed to a detached womb which was traveling around in the body).

However, after World War I, many soldiers came home with problems similar to hysteria. This called into questions the idea of genetic inferiority as a cause of mental illness. Freud began working with hysterical patients and discovered that when they began to talk about some of their life experiences, particularly those that took place in early childhood, their symptoms disappeared. This led him to suggest the first purely psychological explanation for physical problems and mental illness. What he proposed was that **unconscious** motives and desires, fears and anxieties drive our actions. When upsetting memories or thoughts begin to find their way into our consciousness, we develop defenses to shield us from

these painful realities. These defense mechanisms include denying a reality, repressing or pushing away painful thoughts, rationalization or finding a seemingly logical explanation for circumstances, projecting or attributing our feelings to someone else, or outwardly opposing something we inwardly desire (called reaction formation). Freud believed that many mental illnesses are a result of a person's inability to accept reality. Freud emphasized the importance of early childhood experiences in shaping our personality and behavior. In our natural state, we are biological beings. We are driven primarily by instincts. During childhood, however, we begin to become social beings as we learn how to manage our instincts and transform them into socially acceptable behaviors. The type of parenting the child receives has a very power impact on the child's personality development. We will explore this idea further in our discussion of psychosexual development.

Freud's Theory of the Mind

Freud believed that most of our mental processes, motivations and desires are outside of our awareness. Our **consciousness**, that of which we are aware, represents only the tip of the iceberg that comprises our mental state. The preconscious represents that which can easily be called into the conscious mind. During development, our motivations and desires are gradually pushed into the unconscious because raw desires are often unacceptable in society.

Freud's Theory of the Self

As adults, our personality or self consists of three main parts: the **id**, the **ego** and the **superego**. The **id** is the part of the self with

which we are born. It consists of the biologically driven self and includes our instincts and drives. It is the part of us that wants immediate gratification. Later in life, it comes to house our deepest, often unacceptable desires such as sex and aggression. It operates under the **pleasure principle** which means that the criteria for determining whether something is good or bad is whether it feels good or bad. An infant is all **id**. The **ego** is the part of the self that develops as we learn that there are limits on what is acceptable to do and that often, we must wait to have our needs satisfied. This part of the self is realistic and reasonable. It knows how to make compromises. It operates under the **reality principle** or the recognition that sometimes need gratification must be postponed for practical reasons. It acts as a mediator between the id and the **superego** and is viewed as the healthiest part of the self.[14]

The superego's function is to control the id's impulses, especially those which society forbids, such as sex and aggression. It also has the function of persuading the ego to turn to moralistic goals rather than simply realistic ones and to strive for perfection.

The superego consists of two systems: The **conscience** and the **ideal self**. The conscience can punish the ego through causing feelings of guilt. For example, if the ego gives in to the id's demands, the superego may make the person feel bad through guilt.

The ideal self (or ego-ideal) is an imaginary picture of how you ought to be, and represents career aspirations, how to treat other people, and how to behave as a member of society.

Behavior which falls short of the ideal self may be punished by the superego through guilt. The super-ego can also reward us through the ideal self when we behave 'properly' by making us feel proud. If a person's ideal self is too high a standard, then whatever the person does will represent failure. The ideal self and conscience are largely

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determined in childhood from parental values and how you were brought up.[15]
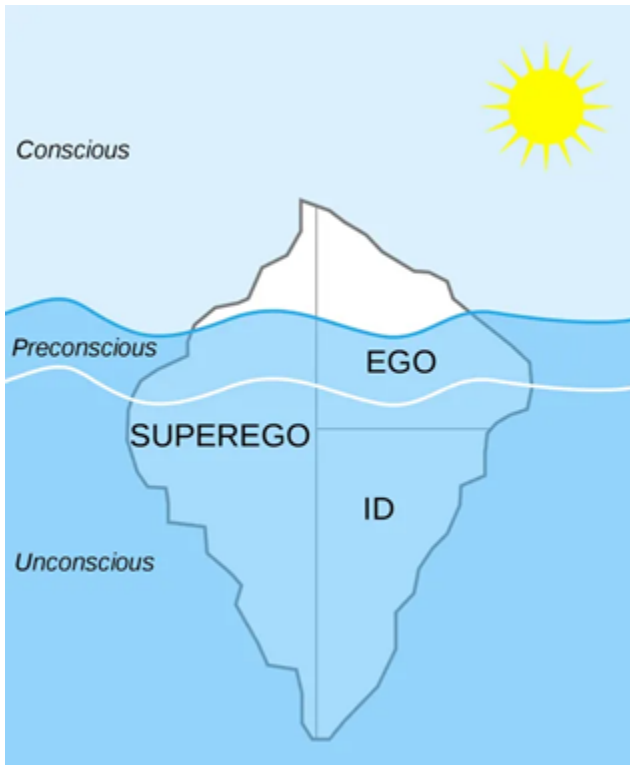
15. McLeod, S. A. (2019, September 25). Id, ego and superego. Simply Psychology. https://www.simplypsychology.org/psyche.html. Licensed under CC BY NC ND 3.0

> Freud's description of personality shows that the ego operates primarily at the conscious level, but also operates somewhat at both the preconscious and unconscious level as does the superego. However, the superego operates mostly at the unconscious level whereas the id totally functions at the unconscious level.[16]

Defense mechanisms emerge to help a person distort reality so that the truth is less painful. Defense mechanisms include repression which means to push the painful thoughts out of consciousness (in other words, think about something else). **Denial** is basically not accepting the truth or lying to the self. Thoughts such as "it won't happen to me" or "you're not leaving" or "I don't have a problem with alcohol" are examples. **Regression** refers to going back to a time when the world felt like a safer place, perhaps reverting to one's childhood. This is less common than the first two defense mechanisms. **Sublimation** involves transforming unacceptable urges into more socially acceptable behaviors. For example, a teenager who experiences strong sexual urges uses exercise to redirect those urges into more socially acceptable behavior. **Displacement** involves taking out frustrations on to a safer target. A person who is angry at a boss may take out their frustration at others when driving home or at a spouse upon arrival. **Projection**

16. Image from McLeod, S. A. (2019, September 25). Id, ego and superego. Simply Psychology. https://www.simplypsychology.org/psyche.html. Licensed under CC BY NC ND 3.0 Text by Maria Pagano

is a defense mechanism in which a person attributes their unacceptable thoughts onto others. If someone is frightened, for example, he or she accuses someone else of being afraid. Finally, **reaction formation** is a defense mechanism in which a person outwardly opposes something they inwardly desire, but that they find unacceptable. An example of this might be homophobia or a strong hatred and fear of homosexuality. This is a partial listing of defense mechanisms suggested by Freud. If the ego is strong, the individual is realistic and accepting of reality and remains more logical, objective, and reasonable. Building ego strength is a major goal of psychoanalysis (Freudian psychotherapy). So, for Freud, having a big ego is a good thing because it does not refer to being arrogant, it refers to being able to accept reality.

The superego is the part of the self that develops as we learn the rules, standards, and values of society. This part of the self takes into account the moral guidelines that are a part of our culture. It is a rule-governed part of the self that operates under a sense of guilt (guilt is a social emotion-it is a feeling that others think less of you or believe you to be wrong). If a person violates the superego, he or she feels guilty. The superego is useful but can be too strong; in this case, a person might feel overly anxious and guilty about circumstances over which they had no control. Such a person may experience high levels of stress and inhibition that keeps them from living well. The id is inborn, but the ego and superego develop during the course of our early interactions with others. These interactions occur against a backdrop of learning to resolve early biological and social challenges and play a key role in our personality development.

Psychosexual Stages

Freud's psychosexual stages of development are presented in the table below. At any of these stages, the child might become "stuck"

or **fixated** if a caregiver either overly indulges or neglects the child's needs. A fixated adult will continue to try and resolve this later in life. Examples of fixation are given after the presentation of each stage.

Freud's Psychosexual Stages

Name of Stage	Descriptions of Stage
Oral Stage	The **oral stage** lasts from birth until around age 2. The infant is all id. At this stage, all stimulation and comfort is focused on the mouth and is based on the reflex of sucking. Too much indulgence or too little stimulation may lead to fixation.
Anal Stage	The **anal stage** coincides with potty training or learning to manage biological urges. The ego is beginning to develop in this stage. Anal fixation may result in a person who is compulsively clean and organized or one who is sloppy and lacks self-control.
Phallic Stage	The **phallic stage** occurs in early childhood and marks the development of the superego and a sense of masculinity or femininity as culture dictates.
Latency	**Latency** occurs during middle childhood when a child's urges quiet down and friendships become the focus. The ego and superego can be refined as the child learns how to cooperate and negotiate with others.
Genital Stage	The **genital stage** begins with puberty and continues through adulthood. Now the preoccupation is that of sex and reproduction.

For about the first year of life, the infant is in the **oral stage** of psychosexual development. The infant meets his or her needs primarily through oral gratification. A baby wishes to suck or chew on any object that comes close to the mouth. Babies explore the world through the mouth and find comfort and stimulation as well. Psychologically, the infant is all id. The infant seeks immediate gratification of needs such as comfort, warmth, food, and stimulation. If the caregiver meets oral needs consistently, the child will move away from this stage and progress further. However, if the caregiver is inconsistent or neglectful, the person may remain stuck in the oral stage. As an adult, the person might not feel good unless

involved in some oral activity such as eating, drinking, smoking, nail-biting, or compulsive talking. These actions bring comfort and security when the person feels insecure, afraid, or bored.

During the **anal stage** which coincides with toddlerhood or mobility and potty-training, the child is taught that some urges must be contained, and some actions postponed. There are rules about certain functions and when and where they are to be carried out. The child is learning a sense of self-control. The ego is being developed. If the caregiver is extremely controlling about potty training (stands over the child waiting for the smallest indication that the child might need to go to the potty and immediately scoops the child up and places him on the potty chair, for example), the child may grow up fearing losing control. He may become fixated in this stage or **"anal retentive"**-fearful of letting go. Such a person might be extremely neat and clean, organized, reliable, and controlling of others. If the caregiver neglects to teach the child to control urges, he may grow up to be "**anal expulsive**" or an adult who is messy, irresponsible, and disorganized.

The **Phallic stage** occurs during the preschool years (ages 3-5) when the child has a new biological challenge to face. Freud believed that the child becomes sexually attracted to his or her opposite sexed parent. Boys experience the "**Oedipal Complex**" in which they become sexually attracted to their mothers but realize that Father is in the way. He is much more powerful. For a while, the boy fears that if he pursues his mother, father may castrate him (**castration anxiety**). So rather than risking losing his penis, he gives up his affections for his mother and instead learns to become more like his father, imitating his actions and mannerisms and thereby learns the role of males in his society. From this experience, the boy learns a sense of masculinity. He also learns what society thinks he should do and experiences guilt if he does not comply. In this way, the superego develops. If he does not resolve this successfully, he may become a "phallic male" or a man who constantly tries to prove his masculinity (about which he is insecure) by seducing women and beating up men! A little girl experiences the "**Electra Complex**" in

which she develops an attraction for her father but realizes that she cannot compete with mother and so gives up that affection and learns to become more like her mother. This is not without some regret, however. Freud believed that the girl feels inferior because she does not have a penis (experiences "**penis envy**"). But she must resign herself to the fact that she is female and will just have to accept her inferior role in society as a female. However, if she does not resolve this conflict successfully, she may have a weak sense of femininity and grow up to be a "castrating female" who tries to compete with men in the workplace or in other areas of life.

During middle childhood (6-11), the child enters the **latency stage** focusing his or her attention outside the family and toward friendships. The biological drives are temporarily quieted (latent) and the child can direct attention to a larger world of friends. If the child is able to make friends, he or she will gain a sense of confidence. If not, the child may continue to be a loner or shy away from others, even as an adult.

The final stage of psychosexual development is referred to as the **genital stage**. From adolescence throughout adulthood a person is preoccupied with sex and reproduction. The adolescent experiences rising hormone levels and the sex drive and hunger drives become very strong. Ideally, the adolescent will rely on the ego to help think logically through these urges without taking actions that might be damaging. An adolescent might learn to redirect their sexual urges into safer activity such as running, for example. Quieting the id with the superego can lead to feeling overly self-conscious and guilty about these urges. Hopefully, it is the ego that is strengthened during this stage and the adolescent uses reason to manage urges.

Strengths and Weaknesses of Freud's Theory

Freud's theory has been heavily criticized for several reasons. One is that it is very difficult to test scientifically. How can parenting

in infancy be traced to personality in adulthood? Are there other variables that might better explain development? The theory is also considered to be sexist in suggesting that women who do not accept an inferior position in society are somehow psychologically flawed. Freud focuses on the darker side of human nature and suggests that much of what determines our actions is unknown to us. So why do we study Freud? As mentioned above, despite the criticisms, Freud's assumptions about the importance of early childhood experiences in shaping our psychological selves have found their way into child development, education, and parenting practices. Freud's theory has heuristic value in providing a framework from which elaborate and modify subsequent theories of development. Many later theories, particularly behaviorism and humanism, were challenges to Freud's views.[17]

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Erik Erikson's (1902-1994) Psychosocial Theory[18]

Erikson suggested that our relationships and society's expectations motivate much of our behavior in his theory of **psychosocial development**. Erikson was a student of Freud's but emphasized the importance of the ego, or conscious thought, in determining our actions. In other words, he believed that we are not driven by unconscious urges. We know what motivates us and we consciously think about how to achieve our goals. He is considered the father of developmental psychology because his model gives us a guideline for the entire life span and suggests certain primary psychological and social concerns throughout life.

Erikson expanded on his Freud's by emphasizing the importance of culture in parenting practices and motivations and adding three stages of adult development (Erikson, 1950; 1968).

He believed that we are aware of what motivates us throughout

18. Image of Erikson is public domain

life and the ego has greater importance in guiding our actions than does the id. We make conscious choices in life and these choices focus on meeting certain social and cultural needs rather than purely biological ones. Humans are motivated, for instance, by the need to feel that the world is a trustworthy place, that we are capable individuals, that we can make a contribution to society, and that we have lived a meaningful life. These are all psychosocial problems.

Erikson divided the lifespan into eight stages. In each stage, we have a major psychosocial task to accomplish or crisis to overcome. Erikson believed that our personality continues to take shape throughout our lifespan as we face these challenges in living. Here is a brief overview of the eight stages:

Erik Erikson's Psychosocial Theory

Name of Stage	Description of Stage
Trust vs. mistrust (0-1)	The infant must have basic needs met in a consistent way in order to feel that the world is a trustworthy place.
Autonomy vs. shame and doubt (1-2)	Mobile toddlers have newfound freedom they like to exercise and by being allowed to do so, they learn some basic independence.
Initiative vs. Guilt (3-5)	Preschoolers like to initiate activities and emphasize doing things "all by myself."
Industry vs. inferiority (6-11)	School aged children focus on accomplishments and begin making comparisons between themselves and their classmates
Identity vs. role confusion (adolescence)	Teenagers are trying to gain a sense of identity as they experiment with various roles, beliefs, and ideas.
Intimacy vs. Isolation (young adulthood)	In our 20s and 30s we are making some of our first long-term commitments in intimate relationships.
Generativity vs. stagnation (middle adulthood)	The 40s through the early 60s we focus on being productive at work and home and are motivated by wanting to feel that we've made a contribution to society.
Integrity vs. Despair (late adulthood)	We look back on our lives and hope to like what we see-that we have lived well and have a sense of integrity because we lived according to our beliefs.

These eight stages form a foundation for discussions on emotional and social development during the life span. Keep in mind, however, that these stages or "crises" can occur more than once. For instance, a person may struggle with a lack of trust beyond infancy under certain circumstances. Erikson's theory has been criticized for focusing so heavily on stages and assuming that the completion of one stage is prerequisite for the next crisis of development. His theory also focuses on the social expectations that are found in certain cultures, but not in all. For instance, the idea that adolescence is a time of searching for identity might translate well in the middle-class culture of the United States, but

not as well in cultures where the transition into adulthood coincides with puberty through rites of passage and where adult roles offer fewer choices. [19]

Learning Theories

While Freud and Erikson looked at what was going on in the mind, learning theories rejected any reference to mind and viewed overt and observable behavior as the proper subject matter of psychology. Through the scientific study of behavior, it was hoped that laws of learning could be derived that would promote the prediction and control of behavior. [20]

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20. History of Psychology by David B. Baker and Heather Sperry is licensed under CC BY-NC-SA 4.0 (modified by Maria Pagano)

Ivan Pavlov (1870-1937)[21] and Classical Conditioning with Animals

Ivan Pavlov

Ivan Pavlov was a Russian physiologist interested in studying digestion. As he recorded the amount of salivation his laboratory dogs produced as they ate, he noticed that they began to salivate before the food arrived as the researcher walked down the hall and toward the cage. "This," he thought, "is not natural!" One would expect a dog to automatically salivate when food hit their palate, but BEFORE the food comes? Of course, what had happened was . . . you tell me. That's right! The dogs knew that the food was coming because they had learned to associate the footsteps with the

21. Image of Pavlov is in the public domain

food. The key word here is "learned". A learned response is called a "conditioned" response.

Pavlov began to experiment with this concept of **classical conditioning**. He began to ring a bell, for instance, prior to introducing the food. Sure enough, after making this connection several times, the dogs could be made to salivate to the sound of a bell. Once the bell had become an event to which the dogs had learned to salivate, it was called a **conditioned stimulus**. The act of salivating to a bell was a response that had also been learned, now termed in Pavlov's jargon, a **conditioned response**. Notice that the response, salivation, is the same whether it is conditioned or unconditioned (unlearned or natural). What changed is the stimulus to which the dog salivates. One is natural (unconditioned) and one is learned (conditioned).

Before conditioning
FOOD   SALIVATION
(UCS)   (UCR)

BELL   NO RESPONSE
                                  ding, ding!

During conditioning
BELL +   SALIVATION
FOOD
(UCS)   (UCR)   ding, ding!
         +

After conditioning
BELL   SALIVATION
(CS)   (CR)   ding, ding!

To summarize, classical conditioning (later developed by Watson, 1913) involves learning to associate an unconditioned stimulus that already brings about a particular response (i.e., a reflex) with a new (conditioned) stimulus, so that the new stimulus brings about the same response.

Pavlov developed some rather unfriendly technical terms to describe this process. The **unconditioned stimulus** (or UCS) is the object or event that originally produces the reflexive /natural response. The response to this is called the **unconditioned response** (or UCR). The **neutral stimulus** (NS) is a new stimulus that does not produce a response. Once the neutral stimulus has become associated with the unconditioned stimulus, it becomes a **conditioned stimulus** (CS). The **conditioned response** (CR) is the response to the conditioned stimulus.[22]

Now, let's think about how classical conditioning is used on us. One of the most widespread applications of classical conditioning principles was brought to us by the psychologist, John B. Watson.[23]

22. Text and image by McLeod, S. A. (2018, October 08). Pavlov's dogs. Simply Psychology. https://www.simplypsychology.org/pavlov.html Licensed under CC BY NC ND 3.0
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John B. Watson (1878-1958)[24] and Classical Conditioning in Humans

   Watson believed that most of our fears and other emotional responses are classically conditioned. He had gained a good deal of popularity in the 1920s with his expert advice on parenting offered to the public. He tried to demonstrate the power of classical conditioning with his famous experiment with an 18-month-old boy named "Little Albert". Watson sat Albert down and introduced a variety of seemingly scary objects to him: a burning piece of newspaper, a white rat, etc. But Albert remained curious and reached for all of these things. Watson knew that one of our only inborn fears is the fear of loud noises so he proceeded to make a loud noise each time he introduced one of Albert's favorites, a white rat. After hearing the loud noise several times paired with the

24. Image of Watson is public domain

rat, Albert soon came to fear the rat and began to cry when it was introduced. Watson filmed this experiment for posterity and used it to demonstrate that he could help parents achieve any outcomes they desired, if they would only follow his advice. Watson wrote columns in newspapers and in magazines and gained a lot of popularity among parents eager to apply science to household order. [25]

Before Conditioning:

Neutral stimulus (white rat) ----→ No fear

UCS (Steel bar hit with a hammer) — CLANG! — Natural reflex → UCR (fear)

During Conditioning:

Neutral stimulus (white rat) + UCS — CLANG! — Natural reflex → UCR (fear)

After Conditioning:

Neutral stimulus (white rat) — Conditioned reflex → UCR (fear)

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Watson's conditioning of Little Albert to fear a white rat.[26]

Operant conditioning, on the other hand, looks at the way the consequences of a behavior increase or decrease the likelihood of a behavior occurring again. So, let's look at this a bit more.[27]

26. Image by McLeod, S. A. (2018, October 08). *Pavlov's dogs*. Simply Psychology. https://www.simplypsychology.org/pavlov.html Licensed under CC BY NC ND 3.0
27. Child Growth and Development: An Open Educational Resources Publication by College of the Canyons by Jennifer Paris, Antoinette Ricardo, and Dawn Richmond is licensed under CC BY 4.0
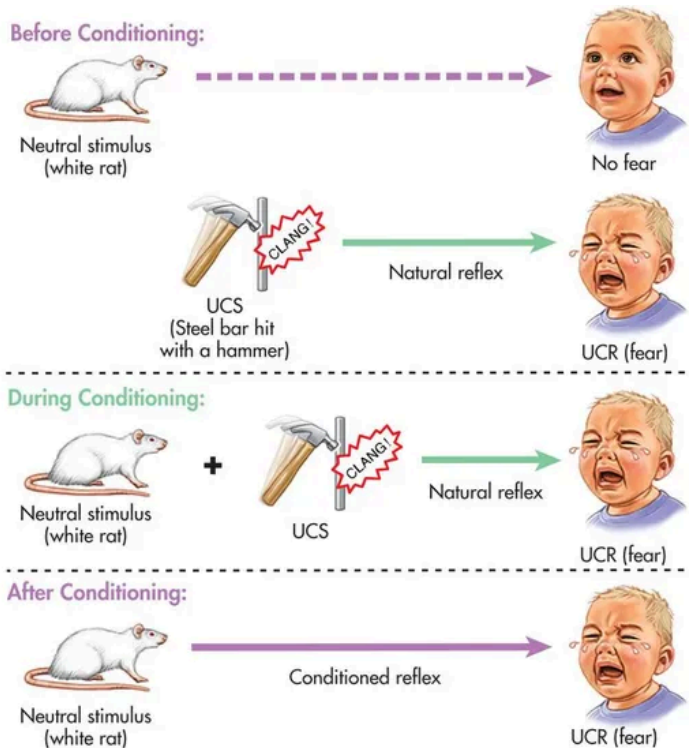
B.F. Skinner (1904-1990)[28] and Operant Conditioning in Animals and Humans

Skinner (1904-1990) brought us the principles of **operant conditioning**, suggested that **reinforcement** is a more effective means of encouraging a behavior than is criticism or punishment. By focusing on strengthening desirable behavior, we have a greater impact than if we emphasize what is undesirable. Reinforcement is anything that an organism desires and is motivated to obtain.

A **reinforcer** is something that encourages or promotes a behavior. Some things are natural rewards. They are considered intrinsic rewards or **primary reinforcers** because their value is easily understood. Think of what kinds of things babies or animals such as puppies find rewarding.

Extrinsic or **secondary reinforcers** are things that have a value

28. Image of Skinner is public domain

not immediately understood. Their value is indirect. They can be traded in for what is ultimately desired.

The use of **positive reinforcement** involves adding something to a situation in order to encourage a behavior. For example, if I give a child a cookie for cleaning a room, the addition of the cookie makes cleaning more likely in the future. Think of ways in which you positively reinforce others.

Negative reinforcement occurs when taking something unpleasant away from a situation encourages behavior. For example, I have an alarm clock that makes a very unpleasant, loud sound when it goes off in the morning. As a result, I get up and turn it off. By removing the noise, I am reinforced for getting up. How do you negatively reinforce others?

Punishment is an effort to stop a behavior. It means to follow an action with something unpleasant or painful. Punishment is often less effective than reinforcement for several reasons. It doesn't indicate the desired behavior, it may result in suppressing rather than stopping a behavior, (in other words, the person may not do what is being punished when you're around, but may do it often when you leave), and a focus on punishment can result in not noticing when the person does well.

Examples of Skinner's Operant Conditioning Using Positive and Negative Reinforcement and Positive and Negative Punishers

	POSITIVE (Get Something)	**NEGATIVE** (Something Gets Taken Away)
REINFORCER (Probability of Behavior Increases)	Infant says "Mama" and mother claps her hands, smiles, and says, "very good, yes Mama!" The infant likes seeing the mother perform this way so continues to say "Mama."	Infant's diaper is wet or dirty, so infant cries. Someone comes and changes the diaper, thereby reducing the discomfort. The next time the child is uncomfortable, the child will cry.
PUNISHER (Probability of Behavior Decreases)	Child pulls the dog's tail and the dog growls at the child. The child becomes frightened and does not pull the dog's tail again.	Child behaves badly and his toy is taken away. The child learns that particular behavior is unacceptable and doesn't want to lose the toy again, so the behavior is decreased or eliminated.

Not all behaviors are learned through association or reinforcement. Many of the things we do are learned by watching others. This is addressed in social learning theory.[29]

Schedules of Reinforcement

Imagine a rat in a "Skinner box." In operant conditioning, if no food pellet is delivered immediately after the lever is pressed then after several attempts the rat stops pressing the lever (how long would someone continue to go to work if their employer stopped paying them?). The behavior has been extinguished.

Behaviorists discovered that different patterns or **schedules of reinforcement** had different effects on the speed of learning and

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extinction. Ferster and Skinner (1957) devised different ways of delivering reinforcement and found that this had effects on

1. The Response Rate – The rate at which the rat pressed the lever (i.e., how hard the rat worked).
2. The Extinction Rate – The rate at which lever pressing dies out (i.e., how soon the rat gave up).

Skinner found that the type of reinforcement which produces the slowest rate of extinction (i.e., people will go on repeating the behavior for the longest time without reinforcement) is **variable-ratio reinforcement**. The type of reinforcement which has the quickest rate of extinction is continuous reinforcement.

Continuous Reinforcement:

An animal/human is positively reinforced every time a specific behavior occurs, e.g., every time a lever is pressed a pellet is delivered, and then food delivery is shut off.

Response rate is SLOW

Extinction rate is FAST

Fixed Ratio Reinforcement:

Behavior is reinforced only after the behavior occurs a specified number of times. e.g., one reinforcement is given after every so many correct responses, e.g., after every 5th response. For example, a child receives a star for every five words spelled correctly.

Response rate is FAST

Extinction rate is MEDIUM

Fixed Interval Reinforcement:

One reinforcement is given after a fixed time interval providing at least one correct response has been made. An example is being paid by the hour. Another example would be every 15 minutes (half hour, hour, etc.) a pellet is delivered (providing at least one lever press has been made) then food delivery is shut off.

Response rate is MEDIUM

Extinction rate is MEDIUM

Variable Ratio Reinforcement:

Behavior is reinforced after an unpredictable number of times. For examples gambling or fishing.

Response rate is FAST

Extinction rate is SLOW (very hard to extinguish because of unpredictability)

Variable Interval Reinforcement:

Providing one correct response has been made, reinforcement is given after an unpredictable amount of time has passed, e.g., on average every 5 minutes. An example is a self-employed person being paid at unpredictable times.

Response rate is FAST

Extinction rate is SLOW[30]
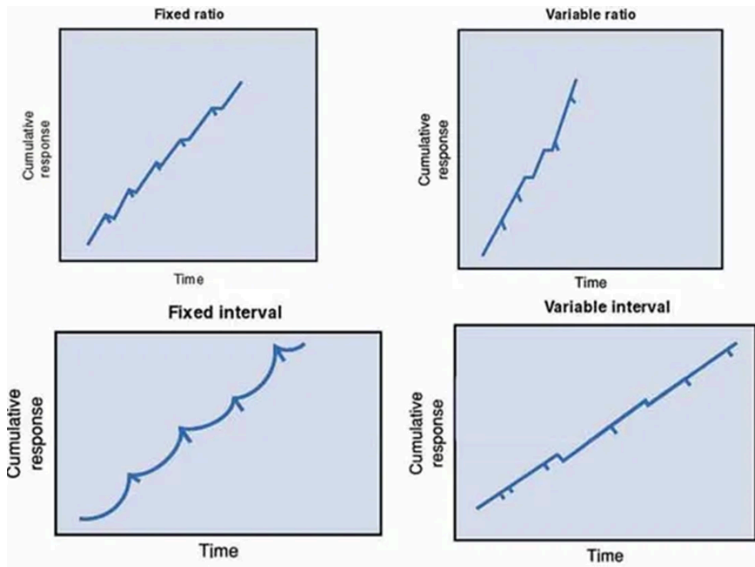
30. McLeod, S. A. (2018, January, 21). *Skinner - operant conditioning.* Simply Psychology. https://www.simplypsychology.org/operant-conditioning.html Licensed under CC BY NC ND 3.0

Applications of Operant Conditioning

Behavior Modification

Behavior modification is a set of therapies/techniques based on operant conditioning (Skinner, 1938, 1953). The main principle comprises changing environmental events that are related to a person's behavior. For example, the reinforcement of desired behaviors and ignoring or punishing undesired ones. This is not as simple as it sounds — always reinforcing desired behavior, for example, is basically bribery. There are different types of positive reinforcements. Primary reinforcement is when a reward strengthens a behavior by itself. Secondary reinforcement is when something strengthens a behavior because it leads to a primary reinforcer.

Token Economy

Tokens can be in the form of fake money, buttons, poker chips, stickers, etc. While the rewards can range anywhere from snacks to privileges or activities. For example, teachers use **token economy**

31. McLeod, S. A. (2018, January, 21). *Skinner - operant conditioning.* Simply Psychology. https://www.simplypsychology.org/operant-conditioning.html Licensed under CC BY NC ND 3.0

at primary school by giving young children stickers to reward good behavior.

Token economy has been found to be very effective in managing psychiatric patients. However, the patients can become over reliant on the tokens, making it difficult for them to adjust to society once they leave prison, hospital, etc.

Staff implementing a token economy program have a lot of power. It is important that staff do not favor or ignore certain individuals if the program is to work. Therefore, staff need to be trained to give tokens fairly and consistently even when there are shift changes such as in prisons or in a psychiatric hospital.

Shaping Behavior

A further important contribution made by Skinner (1951) is the notion of behavior **shaping** through successive approximation. Skinner argues that the principles of operant conditioning can be used to produce extremely complex behavior if rewards and punishments are delivered in such a way as to encourage move an organism closer and closer to the desired behavior each time.

To do this, the conditions (or contingencies) required to receive the reward should shift each time the organism moves a step closer to the desired behavior.

According to Skinner, most animal and human behavior (including language) can be explained as a product of this type of successive approximation.

Educational Applications

In the conventional learning situation, operant conditioning applies largely to issues of class and student management, rather than to learning content. It is very relevant to shaping skill performance.

A simple way to shape behavior is to provide feedback on learner

performance, e.g., compliments, approval, encouragement, and affirmation. A variable-ratio produces the highest response rate for students learning a new task, whereby initially reinforcement (e.g., praise) occurs at frequent intervals, and as the performance improves reinforcement occurs less frequently, until eventually only exceptional outcomes are reinforced.

For example, if a teacher wanted to encourage students to answer questions in class they should praise them for every attempt (regardless of whether their answer is correct). Gradually the teacher will only praise the students when their answer is correct, and over time only exceptional answers will be praised.

Unwanted behaviors, such as tardiness and dominating class discussion can be extinguished through being ignored by the teacher (rather than being reinforced by having attention drawn to them). This is not an easy task, as the teacher may appear insincere if he/she thinks too much about the way to behave.

Knowledge of success is also important as it motivates future learning. However, it is important to vary the type of reinforcement given so that the behavior is maintained. This is not an easy task, as the teacher may appear insincere if he/she thinks too much about the way to behave.[32]

32. McLeod, S. A. (2018, January, 21). *Skinner - operant conditioning.* Simply Psychology. https://www.simplypsychology.org/operant-conditioning.html Licensed under CC BY NC ND 3.0

Albert Bandura (1925-2021)[33] and Social Learning Theory

Albert Bandura is a leading contributor to **social learning theory**. He calls our attention to the ways in which many of our actions are not learned through conditioning; rather, they are learned by watching others (1977). Young children frequently learn behaviors through imitation.

Sometimes, particularly when we do not know what else to do, we learn by **modeling** or copying the behavior of others. A kindergartner on his or her first day of school might eagerly look at how others are acting and try to act the same way to fit in more quickly. Adolescents struggling with their identity rely heavily on their peers to act as role-models. Sometimes we do things because we've seen it pay off for someone else. They were operantly conditioned, but we engage in the behavior because we hope it will

pay off for us as well. This is referred to as vicarious reinforcement (Bandura, Ross and Ross, 1963).

Bandura (1986) suggests that there is interplay between the environment and the individual. We are not just the product of our surroundings, rather we influence our surroundings. Parents not only influence their child's environment, perhaps intentionally through the use of reinforcement, etc., but children influence parents as well. Parents may respond differently with their first child than with their fourth. Perhaps they try to be the perfect parents with their firstborn, but by the time their last child comes along they have very different expectations both of themselves and their child. Our environment creates us, and we create our environment. [34]

34. Exploring Behavior by Lumen Learning is licensed under CC BY 4.0Rasmussen, Eric (2017, Oct 19). Screen Time and Kids: Insights from a New Report. Retrieved from https://www.pbs.org/parents/thrive/screen-time-and-kids-insights-from-a-new-report

Bandura and the Bobo Doll Experiment & Today's Children and the Media

Other social influences: TV or not TV? Bandura (et als. 1963) began a series of studies to look at the impact of television, particularly commercials, on the behavior of children. Are children more likely to act out aggressively when they see this behavior modeled? What if they see it being reinforced? Bandura began by conducting an experiment in which he showed children a film of a woman hitting an inflatable clown or "bobo" doll. Then the children were allowed in the room where they found the doll and immediately began to hit it. This was without any reinforcement whatsoever. Not only that, but they found new ways to behave aggressively. It's as if they learned an aggressive role.

Children view far more television today than in the 1960s; so much, in fact, that they have been referred to as Generation M (media). The amount of screen time varies by age. As of 2017, children 0-8 spend an average of 2 hours and 19 minutes. Children 8-12 years of age spend almost 6 hours a day on screen media. And 13- to 18-year-olds spend an average of just under 9 hours a day in entertainment media use.

The prevalence of violence, sexual content, and messages promoting foods high in fat and sugar in the media are certainly cause for concern and the subjects of ongoing research and policy review. Many children spend even more time on the computer viewing content from the internet. The amount of time spent connected to the internet continues to increase with the use of smartphones that essentially serve as mini-computers. And the ways children and adolescents interact with the media continues to change. The popularity of YouTube and the various social media platforms are examples of this. What might be the implications of this?[31]

3536

Theories also explore cognitive development and how mental processes change over time.

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Cognitive Development

Jean Piaget's (1896-1980) Theory of Cognitive Development

Jean Piaget is one of the most influential cognitive theorists. Piaget was inspired to explore children's ability to think and reason by watching his own children's development. He was one of the first to recognize and map out the ways in which children's thought differs from that of adults. His interest in this area began when he was asked to test the IQ of children and began to notice that there was a pattern in their wrong answers. He believed that children's intellectual skills change over time through maturation. Children of differing ages interpret the world differently.

Piaget believed our desire to understand the world comes from a need for cognitive equilibrium. This is an agreement or balance between what we sense in the outside world and what we know in our minds. If we experience something that we cannot understand, we try to restore the balance by either changing our thoughts or by altering the experience to fit into what we do understand. Perhaps you meet someone who is very different from anyone you know.

How do you make sense of this person? You might use them to establish a new category of people in your mind or you might think about how they are similar to someone else.

A **schema** or schemes are categories of knowledge. They are like mental boxes of concepts. A child has to learn many concepts. They may have a scheme for "under" and "soft" or "running" and "sour". All of these are schema. Our efforts to understand the world around us lead us to develop new schema and to modify old ones.

One way to make sense of new experiences is to focus on how they are similar to what we already know. This is **assimilation**. So, the person we meet who is very different may be understood as being "sort of like my brother" or "his voice sounds a lot like yours." Or a new food may be assimilated when we determine that it tastes like chicken!

Another way to make sense of the world is to change our mind. We can make a cognitive **accommodation** to this new experience by adding new schema. This food is unlike anything I've tasted before. I now have a new category of foods that are bitter-sweet in flavor, for instance. This is accommodation. Do you accommodate or assimilate more frequently? Children accommodate more frequently as they build new schema. Adults tend to look for similarity in their experience and assimilate. They may be less inclined to think "outside the box."

Piaget suggested different ways of understanding that are associated with maturation. He divided this understanding into the following four stages which will be discussed in detail in Chapter X:

Piaget's Stages of Cognitive Development[37]

37. Lifespan Development: A Psychological Perspective 2nd Edition by Martha Lally and Suzanne Valentine-French is licensed under CC BY-NC-SA 3.0

Stage	Approximate age range	Characteristics	Stage attainments
Sensorimotor	Birth to about 2 years	Children experience the world through their fundamental senses of seeing, hearing, touching, and tasting.	Object permanence
Preoperational	2 to 7 years	Children acquire the ability to internally represent the world through language and mental imagery. They also start to see the world from other people's perspectives.	Theory of mind; rapid increase in language ability
Concrete operational	7 to 11 years	Children become able to think logically. They can increasingly perform operations on objects that are real.	Conservation
Formal operational	11 years to adulthood	Adolescents can think systematically, can reason about abstract concepts, and can understand ethics and scientific reasoning.	Abstract logic

Criticisms of Piaget's Theory

Piaget has been criticized for overemphasizing the role that physical maturation plays in cognitive development and in underestimating the role that culture and interaction (or experience) plays in cognitive development. Looking across cultures reveals considerable variation in what children are able to do at various ages. Piaget may have underestimated what children are capable of given the right circumstances.[38]

38. Lecture Transcript: Developmental Theories by Lumen Learning is licensed under CC BY 4.0 (modified by Jennifer Paris)

Lev Vygotsky (1896-1934): Sociocultural Theory[39]

Lev Vygotsky was a Russian psychologist who wrote in the early 1900s but whose work was discovered in the United States in the 1960s but became more widely known in the 1980s. Vygotsky differed with Piaget in that he believed that a person not only has a set of abilities, but also a set of potential abilities that can be realized if given the proper guidance from others. His **sociocultural theory** emphasizes the importance of culture and interaction in the development of cognitive abilities. He believed that through guided participation known as **scaffolding**, with a teacher or capable peer, a child can learn cognitive skills within a certain range known as the **zone of proximal development**.[40]

39. Image by The Vigotsky Project is licensed under CC BY-SA 3.0
40. Exploring Cognition by Lumen Learning is licensed under CC BY 4.0

Have you ever taught a child to perform a task? Maybe it was brushing their teeth or preparing food. Chances are you spoke to them and described what you were doing while you demonstrated the skill and let them work along with you all through the process. You gave them assistance when they seemed to need it, but once they knew what to do-you stood back and let them go. This is scaffolding and can be seen demonstrated throughout the world. This approach to teaching has also been adopted by educators. Rather than assessing students on what they are doing, they should be understood in terms of what they are capable of doing with the proper guidance. You can see how Vygotsky would be very popular with modern day educators.[41]

Comparing Piaget and Vygotsky

Vygotsky concentrated more on the child's immediate social and cultural environment and his or her interactions with adults and peers. While Piaget saw the child as actively discovering the world through individual interactions with it, Vygotsky saw the child as more of an apprentice, learning through a social environment of others who had more experience and were sensitive to the child's needs and abilities.[42]

Information Processing

Information Processing is not the work of a single theorist but based on the ideas and research of several cognitive scientists studying

41. Exploring Cognition by Lumen Learning is licensed under CC BY 4.0
42. Children's Development by Ana R. Leon is licensed under CC BY 4.0

how individuals perceive, analyze, manipulate, use, and remember information. This approach assumes that humans gradually improve in their processing skills; that is, cognitive development is continuous rather than stage-like. The more complex mental skills of adults are built from the primitive abilities of children. We are born with the ability to notice stimuli, store, and retrieve information. Brain maturation enables advancements in our information processing system. At the same time, interactions with the environment also aid in our development of more effective strategies for processing information.[43]

Urie Bronfenbrenner's (1917-2005) Ecological Systems Model[44]

Bronfenbrenner offers us one of the most comprehensive theories of human development. Bronfenbrenner studied Freud, Erikson, Piaget, and learning theorists and believed that all those theories could be enhanced by adding the dimension of context.

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43. Lifespan Development: A Psychological Perspective 2nd Edition by Martha Lally and Suzanne Valentine-French is licensed under CC BY-NC-SA 3.0
44. Image by Marco Vicente González is licensed under CC BY-SA 4.0

What is being taught and how society interprets situations depends on who is involved in the life of a child and on when and where a child lives. Bronfenbrenner's ecological systems model explains the direct and indirect influences on an individual's development.[45] The individual is impacted by several systems including:

- **Microsystem** includes the individual's setting and those who have direct, significant contact with the person, such as parents or siblings. The input of those is modified by the cognitive and biological state of the individual as well. These influence the person's actions, which in turn influence systems operating on him or her.
- **Mesosystem** includes the larger organizational structures, such as school, the family, or religion. These institutions impact the microsystems just described. The philosophy of the school system, daily routine, assessment methods, and other characteristics can affect the child's self-image, growth, sense of accomplishment, and schedule thereby impacting the child, physically, cognitively, and emotionally.
- **Exosystem** includes the larger contexts of community. A community's values, history, and economy can impact the organizational structures it houses. Mesosystems both influence and are influenced by the exosystem.
- **Macrosystem** includes the cultural elements, such as global economic conditions, war, technological trends, values, philosophies, and a society's responses to the global community.
- **Chronosystem** is the historical context in which these experiences occur. This relates to the different generational time periods previously discussed, such as the baby boomers

45. Child Growth and Development: An Open Educational Resources Publication by College of the Canyons by Jennifer Paris, Antoinette Ricardo, and Dawn Richmond is licensed under CC BY 4.0

and millennials.

In sum, a child's experiences are shaped by larger forces, such as the family, schools, religion, culture, and time period. Bronfenbrenner's model helps us understand all the different environments that impact each one of us simultaneously. Despite its comprehensiveness, Bronfenbrenner's ecological system's theory is not easy to use. Taking into consideration all the different influences makes it difficult to research and determine the impact of all the different variables (Dixon, 2003). Consequently, psychologists have not fully adopted this approach, although they recognize the importance of the ecology of the individual.[46]

Bronfenbrenner's Ecological Systems Theory[47]

46. Lifespan Development: A Psychological Perspective 2nd Edition by Martha Lally and Suzanne Valentine-French is licensed under CC BY-NC-SA 3.0
47. Image by Ian Joslin is licensed under CC BY 4.0

Macrosystem
Economic and political system, dominant beliefs and ideologies

Exosystem

Mesosystem
(Interaction of any two microsystems)

Microsystem
(Bidirectional influences)

The Developing Child:
age, sex, health, abilities, temperament

Religious hierarchy

Local religious community

Mass media

Peer group

Shopping centers

Parents' friends

Home

Neighborhood

Transit system

Parents' workplace

School

Educational system

Community and government agencies

Chronosystem
(Dimension of time)

Changing personal and societal conditions over the life course

Esther Thelen: Dynamic Systems Theory[48]

The dominant view of motor development for much of the 20th century was that the development of action occurred in a series of relatively fixed motor milestones. The emphasis was on normative development, the concept of motor programs that controlled action, and a sequence of milestones that was largely under genetic or biological control (for review, see Adolph & Berger, 2006). The landscape has shifted dramatically in the last 20 years, thanks in large part to the work of Esther Thelen (as well as other systems thinkers, most notably, Gibson, 1988; see Adolph & Berger, 2006). Today the field views motor development as emergent and exploratory with a new emphasis on individual development in context. Although this revolution in thinking was spurred by dynamic systems concepts, it was also driven forward by a wealth of empirical research.

For instance, Esther Thelen conducted a now-classic set of studies investigating the early disappearance of the stepping reflex.

48. Slideshare photo

Thelen's early work on stepping revealed that the coordination patterns that underlie stepping and kicking were strikingly similar. The puzzle was that newborn stepping disappeared within the first three months, whereas kicking continued and increased in frequency. To explain the disappearance of stepping, several researchers had proposed that maturing cortical centers inhibit the primitive stepping reflex or that stepping was phylogenetically programmed to disappear (e.g., Andre-Thomas & Autgaerden, 1966).

To probe the mystery of the disappearing steps, Thelen conducted a longitudinal study that focused on the detailed development of individual infants. Thelen, Fisher, and Ridley-Johnson (1984) found a clue in the fact that chubby babies and those who gained weight fastest were the first to stop stepping. This led to the hypothesis that it requires more strength for young infants to lift their legs when upright (in a stepping position) than when lying down (in a kicking position). To test this idea, Thelen and colleagues conducted two ingenious studies. In one, they placed small leg weights on two-month-old babies, similar in amount to the weight they would gain in the ensuing month. This significantly reduced stepping. In the other, they submerged older infants whose stepping had begun to wane in water up to chest levels. Robust stepping now reappeared. These data demonstrated that traditional explanations of neural maturation and innate capacities were insufficient to explain the emergence of new patterns and the flexibility of motor behavior.

Since this seminal work, Thelen and her colleagues have intensively examined the development of alternating leg movements (Thelen & Ulrich, 1991), the emergence of crawling (Adolph, Vereijken, & Denny, 1988), the emergence of walking (e.g., Adolph, 1997; Thelen & Ulrich, 1991), and the development of reaching (Corbetta, Thelen, & Johnson, 2000; Thelen, Corbetta & Spencer, 1996; Thelen et al., 1993). In all cases, these researchers have shown that new action patterns emerge in the moment from the self-organization of multiple components. The stepping studies elegantly illustrated this, showing how multiple factors cohere in a

moment in time to create or hinder leg movements. And, further, these studies illustrate how changes in the components of the motor system over the longer time scale of development interact with real-time behavior.[49]

Conclusion

Many early theories of human development were created and popularized in the early 1900s. These are referred to as stage theories because they present development as occurring in stages. The assumption is that once one stage is completed, a person moves into the next stage and that stages tend to occur only once. Some examples of stage theories that we will be studying include Freud's psychosexual stages, Erikson's psychosocial stages, and Piaget's stages of cognitive development, to name a few.

These theories are appealing in a way because they provide the ability to predict what will happen next and they allow us to attribute behavior to a person's being 'in a stage'. These theories offered the security of understanding human behavior in a time of rapid change during industrialization in the early 1900s. Science seemed to be laying a predictable groundwork we could rely upon. But these early theories also implied that those who did not progress through stages in the predictable way were delayed somehow and this led to the idea that development had to occur in a patterned way.

Today we understand that development does not occur in a straight line. Sometimes we change in many directions depending

49. Twenty years and going strong: A dynamic systems revolution in motor and cognitive development by John P. Spencer, Sammy Perone, and Aaron T. Buss is a public domain article published by the National Center for Biotechnology Information

on our experiences and surroundings. For example, there can be growth and decline in cognitive functioning at any age depending on nutrition, health, activity, and stimulation. And that both nature (heredity) and nurture (the environment) shape our abilities throughout life. Some things about us are continuous such as our temperament or sense of self, perhaps. And we may revisit a stage of life more than once. For instance, Erikson suggests that we struggle with trust as infants and then begin to focus more on independence or autonomy. But if we are in circumstances in which our independence is jeopardized, such as becoming physically dependent, we may struggle with trust again. Keep these thoughts in mind as we explore stage theories in our next lesson.

The study of human development is based on research. The next chapter looks at some of the different types of research methods used to understand development. In other words, how do we know what we know?[50]

50. Lecture Transcript: Lifespan Development by Lumen Learning is licensed under CC BY 4.0 (modified by Maria Pagano)

2. Research Methods

Learning Objectives

After reading Chapter 2, you should be better equipped to

- Describe the scientific method and explain how it is used to study development.
- Explain the differences between qualitative and quantitative approaches to research methods.
- Explain the differences between descriptive and experimental designs.
- Understand when and how to use different research methodologies and the strengths and limitations of each methodology.
- Explain the types of research methodologies that are specific to conducting research in developmental psychology.
- Describe when and how to use preferential looking designs and the different habituations designs.
- Understand the protections used when conducting research with vulnerable populations like infants and children.

Knowing What We Know

Scientific research is a critical tool for successfully navigating our complex world. Without it, we would be forced to rely solely on intuition, other people's authority, and blind luck. While many of us feel confident in our abilities to decipher and interact with the world around us, history is filled with examples of how very wrong we can be when we fail to recognize the need for evidence in supporting claims. For example, even today, some individuals believe that newborn infants can only see the colors black and white. However, Bower (1966)[1] demonstrated that while limited, newborn infants do have the ability to see color.

The goal of all scientists is to better understand the world around them. Psychologists focus their attention on understanding behavior, as well as the cognitive (mental) and physiological (body) processes that underlie behavior. In contrast to other methods that people use to understand the behavior of others, such as intuition and personal experience, the hallmark of scientific research is that there is evidence to support a claim. Scientific knowledge is **empirical**: It is grounded in objective, tangible evidence that can be observed time and time again, regardless of who is observing.

While behavior is observable, the mind is not. If someone is crying, we can see behavior. However, the reason for the behavior is more difficult to determine. Is the person crying due to being sad, in pain, or happy? Sometimes we can learn the reason for someone's behavior by simply asking a question, like "Why are you crying?" However, there are situations in which an individual is either uncomfortable or unwilling to answer the question honestly or is incapable of answering. For example, infants would not be able to explain why they are crying. In such circumstances, the

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1. Bower, T. G. R. (1966). The visual world of infants. Scientific American, 215(6), 80-92

psychologist must be creative in finding ways to better understand behavior.

Scientific knowledge is advanced through a process known as the **scientific method**. Basically, ideas (in the form of theories and hypotheses are tested against the real world (in the form of empirical observations, and those empirical observations lead to more ideas that are tested against the real world, and so on.

The basic steps in the scientific method are:

- Observe a natural phenomenon and define a question about it
- Make a hypothesis, or potential solution to the question
- Test the hypothesis
- If the hypothesis is true, find more evidence or find counter-evidence
- If the hypothesis is false, create a new hypothesis or try again
- Draw conclusions and repeat–the scientific method is never-ending, and no result is ever considered perfect

In order to ask an important question that may improve our understanding of the world, a researcher must first observe natural phenomena. By making observations, a researcher can define a useful question. After finding a question to answer, the researcher can then make a prediction in the form of a **hypothesis** about what he or she thinks the answer will be. This prediction is usually a statement about the relationship between two or more variables. After making a hypothesis, the researcher will then design an experiment to test his or her hypothesis and evaluate the data gathered. These data will either support or refute the hypothesis. Based on the conclusions drawn from the data, the researcher will then find more evidence to support the hypothesis, look for counterevidence to further strengthen the hypothesis, revise the hypothesis and create a new experiment, or continue to incorporate the information gathered to answer the research question.
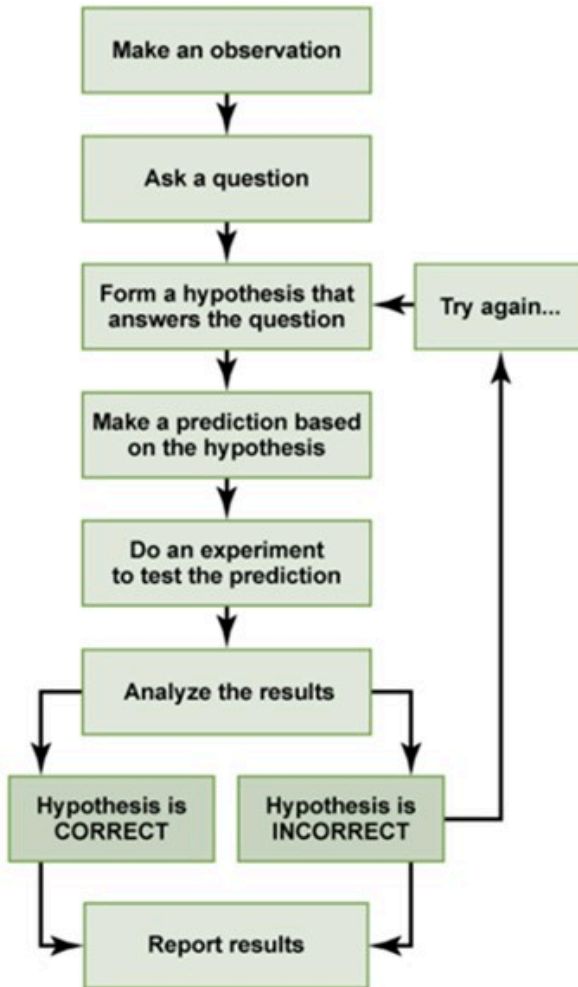
The scientific method is a process for gathering data and processing information. It provides well-defined steps to standardize how scientific knowledge is gathered through a logical, rational problem-solving method.

The Basic Principles of the Scientific Method

Two key concepts in the scientific approach are **theory** and **hypothesis**. A theory is a well-developed set of ideas that propose an explanation for observed phenomena that can be used to make predictions about future observations. A hypothesis is a testable prediction that is arrived at logically from a theory. It is often worded as an if-then statement (e.g., if I study all night, I will get a passing grade on the test). The hypothesis is extremely important because it bridges the gap between the realm of ideas and the real world. As specific hypotheses are tested, theories are modified and refined to reflect and incorporate the result of these tests.
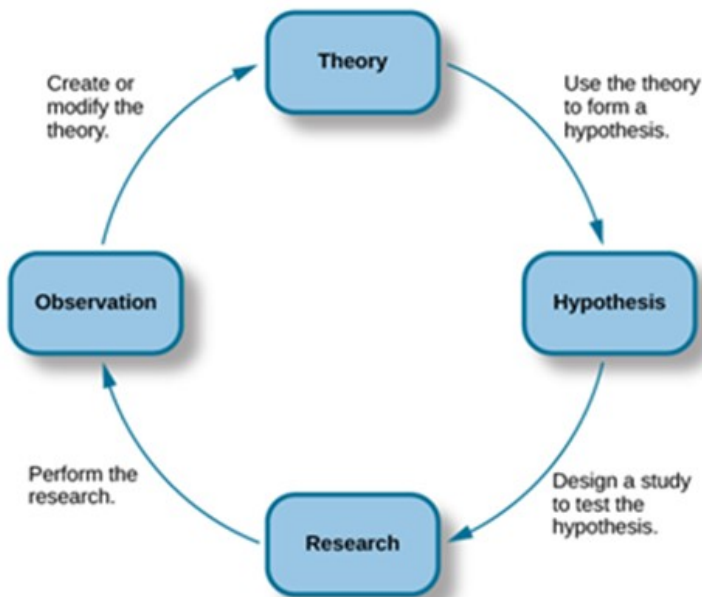
The scientific method of research includes proposing hypotheses, conducting research, and creating or modifying theories based on results.

Applying the Scientific Method

To see how this process works, let's consider a specific theory and a hypothesis that might be generated from that theory. As you'll learn in a later module, the James-Lange theory of emotion asserts that emotional experience relies on the physiological arousal associated with the emotional state. If you walked out of your home and discovered a very aggressive snake waiting on your doorstep, your heart would begin to race and your stomach churn. According to the James-Lange theory, these physiological changes would result in your feeling of fear. A hypothesis that could be derived from this theory might be that a person who is unaware of the physiological arousal that the sight of the snake elicits will not feel fear.

Remember that a good scientific hypothesis is **falsifiable**, or capable of being shown to be incorrect. Recall from Chapter 1 that Sigmund Freud had lots of interesting ideas to explain various human behaviors. However, a major criticism of Freud's theories is that many of his ideas are not falsifiable; for example, it is impossible to imagine empirical observations that would disprove the existence of the id, the ego, and the superego—the three elements of personality described in Freud's theories. Despite this, Freud's theories are widely taught in introductory psychology texts because of their historical significance for personality psychology and psychotherapy, and these remain the root of all modern forms of therapy.

Why the Scientific Method Is Important for Psychology

The use of the **scientific method** is one of the main features that separates modern psychology from earlier philosophical inquiries about the mind. Compared to chemistry, physics, and other "natural

sciences," psychology has long been considered one of the "social sciences" because of the subjective nature of the things it seeks to study. Many of the concepts that psychologists are interested in—such as aspects of the human mind, behavior, and emotions—are subjective and cannot be directly measured. Psychologists often rely instead on behavioral observations and self-reported data, which are considered by some to be illegitimate or lacking in methodological rigor. Applying the scientific method to psychology, therefore, helps to standardize the approach to understanding its very different types of information.

The scientific method allows psychological data to be replicated and confirmed in many instances, under different circumstances, and by a variety of researchers. Through replication of experiments, new generations of psychologists can reduce errors and broaden the applicability of theories. It also allows theories to be tested and validated instead of simply being conjectures that could never be verified or falsified. All of this allows psychologists to gain a stronger understanding of how the human mind works.

Scientific articles published in journals and psychology papers written in the style of the American Psychological Association (i.e., in "APA style") are structured around the scientific method. These papers include an Introduction, which introduces the background information and outlines the hypotheses; a Methods section, which outlines the specifics of how the experiment was conducted to test the hypothesis; a Results section, which includes the statistics that tested the hypothesis and state whether it was supported or not supported, and a Discussion and Conclusion, which state the implications of finding support for, or no support for, the hypothesis. Writing articles and papers that adhere to the scientific method makes it easy for future researchers to repeat the study and attempt to replicate the results.[2]

2. All images and text found under this footnote are from Lumenlearning, Introduction to Psychology Module 2:

General Research Methodologies: Qualitative and Quantitative Research Methods

Qualitative methods of research involve using a more open, evolving approach to finding out about the world. There is less emphasis on quantifying what is known and more emphasis on tapping into the experiences, assumptions, and meanings subjects give to their situations. Qualitative methods can be used to explore an area about which little is known or to get a fresh look at a situation that has been studied before. The use of narratives in which the researcher tries to find out what is going on by using the subjects' own words is one approach. Qualitative methods are used in anthropology, education, nursing, and other areas where the researcher wishes to be led by the participants into seeing what they deem as important.

The researcher begins with a broad interest and gains entrance into a setting in which to explore. Information is gathered using a variety of techniques such as observation, documenting the physical space and surroundings of that setting, recording interviews, etc. After gathering general information, the researcher may decide to focus more closely on specific research questions. Patterns may become apparent as the researcher revisits their field notes and spends more time in a setting. These prompt the researcher to explore new ideas until they feel they reach a point of saturation, or a feeling that they've thoroughly explored the situation. Patterns

and answers to research questions are noted in a report of the findings.

Researchers who use qualitative methods might take the following steps when conducting research:

1. Begin with a broad area of interest
2. Gain entrance into a group to be researched
3. Gather field notes about the setting, the people, the structure, the activities or other areas of interest
4. Ask open ended, broad "grand tour" types of questions when interviewing subjects
5. Modify research questions as study continues
6. Note patterns or consistencies
7. Explore new areas deemed important by the people being observed
8. Report findings

In this type of research, theoretical ideas are "grounded" in the experiences of the participants. The researcher is the student and the people in the setting are the teachers as they inform the researcher of their world (Glazer & Strauss, 1967). Researchers are to be aware of their own biases and assumptions, acknowledge them and bracket them in efforts to keep them from limiting accuracy in reporting. Sometimes qualitative studies are used initially to explore a topic and more quantitative studies are used to test or explain what was first described.

Quantitative methods involve beginning with a research question, reviewing the literature to see what others have found in their research of the topic, determining specifically what aspect of the topic to explore in your research and determining the most appropriate method to use for your purposes, conducting the study, which means finding your sample, administering your survey or conducting your experiments, interpreting the results by analyzing your data, drawing conclusions about what you have found, and

finally sharing your findings with others in the scientific community by publishing your research.

Researchers using quantitative methods typically take the following steps when conducting research:

1. Determining a research question
2. Reviewing previous studies addressing the topic in question (known as a literature review)
3. Determining a method of gathering information
4. Conducting the study
5. Interpreting results
6. Drawing conclusions; stating limitations of the study and suggestions for future research
7. Making your findings available to others (both to share information and to have your work scrutinized by others)

This model of scientific investigation presents research as a linear process guided by a specific research question or hypothesis, and it typically involves quantifying or using statistics to understand and report what has been studied. Many academic journals publish reports on studies conducted in this manner and a good way to become more familiar with these steps is to look at journal articles which will be written in sections that follow these 7 steps.[3]

Specific Research Methodologies

A **research design** is the specific method a researcher uses to collect, analyze, and interpret data. Psychologists use three major types of research designs in their research, and each provides an essential avenue for scientific investigation. **Descriptive or qualitative research** is research that describes what is occurring at a point in time. **Correlational research** is research designed to discover relationships among variables and to allow the prediction

of future events from present knowledge. **Experimental research** is research in which a researcher manipulates one or more variables to see their effects. Each of the three research designs varies according to its strengths and limitations.[3]

Each of these research methods has unique strengths and weaknesses, and each method may only be appropriate for certain types of research questions. For example, studies that rely primarily on observation produce incredible amounts of information, but the ability to apply this information to the larger population is somewhat limited because of small sample sizes. Survey research, on the other hand, allows researchers to easily collect data from relatively large samples. While this allows for results to be generalized to the larger population more easily, the information that can be collected on any given survey is somewhat limited and subject to problems associated with any type of self-reported data. Some researchers conduct archival research by using existing records. While this can be a fairly inexpensive way to collect data that can provide insight into a number of research questions, researchers using this approach have no control on how or what kind of data was collected.

Correlational research can find a relationship between two variables, but the only way a researcher can claim that the relationship between the variables is cause and effect is to perform an experiment. In experimental research, which will be discussed later in the text, there is a tremendous amount of control over variables of interest. While this is a powerful approach, experiments are often conducted in very artificial settings. This calls into question the validity of experimental findings with regard to how they would apply in real-world settings. In addition, many of the

3. Lifespan Development: A Psychological Perspective 2nd Edition by Martha Lally and Suzanne Valentine-French is licensed under CC BY-NC-SA 3.0[5] From Lumenlearning, Introduction to Psychology Module 2: Psychological research   is licensed under CC BY SA 4.0

questions that psychologists would like to answer cannot be pursued through experimental research because of ethical concerns.

Descriptive or Qualitative Research

Descriptive or qualitative research methods include the **case study**, **naturalistic observation/observational research**, **surveys**, **interviews**, **psychophysiological assessments**, and secondary/**content analysis or archival research**.

Case Study Methodology

In 2011, the *New York Times* published a feature story on Krista and Tatiana Hogan, Canadian twin girls. These particular twins are unique because Krista and Tatiana are conjoined twins, connected at the head. There is evidence that the two girls are connected in a part of the brain called the thalamus, which is a major sensory relay center. Most incoming sensory information is sent through the thalamus before reaching higher regions of the cerebral cortex for processing.

The implications of this potential connection mean that it might be possible for one twin to experience the sensations of the other twin. For instance, if Krista is watching a particularly funny television program, Tatiana might smile or laugh even if she is not watching the program. This particular possibility has piqued the interest of many neuroscientists who seek to understand how the brain uses sensory information.

These twins represent an enormous resource in the study of the brain, and since their condition is very rare, it is likely that as long as their family agrees, scientists will follow these girls very closely

throughout their lives to gain as much information as possible (Dominus, 2011).

In observational research, scientists are conducting a clinical or **case study** when they focus on one person or just a few individuals. Indeed, some scientists spend their entire careers studying just 10–20 individuals. Why would they do this? Obviously, when they focus their attention on a very small number of people, they can gain a tremendous amount of insight into those cases. The richness of information that is collected in clinical or case studies is unmatched by any other single research method. This allows the researcher to have a very deep understanding of the individuals and the particular phenomenon being studied.

If clinical or case studies provide so much information, why are they not more frequent among researchers? As it turns out, the major benefit of this particular approach is also a weakness. As mentioned earlier, this approach is often used when studying individuals who are interesting to researchers because they have a rare characteristic. Therefore, the individuals who serve as the focus of case studies are not like most other people. If scientists ultimately want to explain all behavior, focusing attention on such a special group of people can make it difficult to generalize any observations to the larger population as a whole. Generalizing refers to the ability to apply the findings of a particular research project to larger segments of society. Again, case studies provide enormous amounts of information, but since the cases are so specific, the potential to apply what's learned to the average person may be very limited.[5]

How is the Case Study Conducted?

The procedure used in a case study means that the researcher provides a description of the behavior. This comes from interviews and other sources, such as observation.

The client also reports detail of events from his or her point

of view. The researcher then writes up the information from both sources above as the case study and interprets the information. The research may also continue for an extended period of time, so processes and developments can be studied as they happen.

Amongst the sources of data the psychologist is likely to turn to when carrying out a case study are observations of a person's daily routine, unstructured interviews with the participant herself (and with people who know her), diaries, personal notes (e.g. letters, photographs, notes) or official document (e.g. case notes, clinical notes, appraisal reports).

The case study method often involves simply observing what happens to, or reconstructing the **case history** of a single participant or group of individuals (such as a school class or a specific social group), i.e. the idiographic approach.

The interview is also an extremely effective procedure for obtaining information about an individual, and it may be used to collect comments from the person's friends, parents, employer, workmates and others who have a good knowledge of the person, as well as to obtain facts from the person him or herself.

Most of this information is likely to be qualitative (i.e. verbal description rather than measurement) but the psychologist might collect numerical data as well.

Strengths of Case Studies

- Provides detailed (rich qualitative) information.
- Provides insight for further research.
- Permitting investigation of otherwise impractical (or unethical) situations.

Case studies allow a researcher to investigate a topic in far more detail than might be possible if they were trying to deal with a large

number of research participants (nomothetic approach) with the aim of 'averaging'.

Because of their in-depth, multi-sided approach case studies often shed light on aspects of human thinking and behavior that would be unethical or impractical to study in other ways.

Research which only looks into the measurable aspects of human behavior is not likely to give us insights into the subjective dimension to experience which is so important to psychoanalytic and humanistic psychologists.

Case studies are often used in exploratory research. They can help us generate new ideas (that might be tested by other methods). They are an important way of illustrating theories and can help show how different aspects of a person's life are related to each other.

The method is therefore important for psychologists who adopt a holistic point of view (i.e. humanistic psychologists).

Limitations of Case Studies

- Lacking scientific rigor and providing little basis for generalization of results to the wider population.
- Researchers' own subjective feeling may influence the case study (researcher bias).
- Difficult to replicate.
- Time-consuming and expensive.
- The volume of data, together with the time restrictions in place, impacted on the depth of analysis that was possible within the available resources.

Because a case study deals with only one person/event/group we can never be sure if the case study investigated is representative of the wider body of "similar" instances. This means the conclusions drawn from a particular case may not be transferable to other settings.

Because case studies are based on the analysis of qualitative (i.e. descriptive) data a lot depends on the interpretation the psychologist places on the information she has acquired.

This means that there is a lot of scope for observer bias and it could be that the subjective opinions of the psychologist intrude in the assessment of what the data means.

For example, Freud has been criticized for producing case studies in which the information was sometimes distorted to fit the particular theories about behavior (e.g. Little Hans).

This is also true of Money's interpretation of the Bruce/Brenda case study (Diamond, 1997) when he ignored evidence that went against his theory.[4]

Naturalistic Observations/ Observational Research Methodology

Observational studies involve watching and recording the actions of participants. This may take place in the natural setting, such as observing children at play at a park, or behind a one-way glass while children are at play in a laboratory playroom. The researcher may follow a checklist and record the frequency and duration of events (perhaps how many conflicts occur among 2- year-olds) or may observe and record as much as possible about an event (such as observing children in a classroom and capturing the details about the room design and what the children and teachers are doing and saying).[5]

We want our researcher to be inconspicuous—perhaps, as

4. McLeod, S. A. (2019, August 03). *Case study method.* Simply Psychology is licensed under CC BY NC 3.0.
5. Children's Development by Ana R. Leon is licensed under CC BY 4.0

mentioned above standing behind one-way glass. This type of observational study is called **naturalistic observation**: observing behavior in its natural setting. To better understand peer exclusion, Suzanne Fanger collaborated with colleagues at the University of Texas to observe the behavior of preschool children on a playground. How did the observers remain inconspicuous over the duration of the study? They equipped a few of the children with wireless microphones (which the children quickly forgot about) and observed while taking notes from a distance. Also, the children in that particular preschool (a "laboratory preschool") were accustomed to having observers on the playground (Fanger, Frankel, & Hazen, 2012).

It is critical that the observer be as unobtrusive and as inconspicuous as possible: when people know they are being watched, they are less likely to behave naturally. If you have any doubt about this, ask yourself how your driving behavior might differ in two situations: In the first situation, you are driving down a deserted highway during the middle of the day; in the second situation, you are being followed by a police car down the same deserted highway (Figure 1).

It should be pointed out that naturalistic observation is not limited to research involving humans. Indeed, some of the best-known examples of naturalistic observation involve researchers going into the field to observe various kinds of animals in their own environments. As with human studies, the researchers maintain their distance and avoid interfering with the animal subjects so as not to influence their natural behaviors. Scientists have used this technique to study social hierarchies and interactions among animals ranging from ground squirrels to gorillas. The information provided by these studies is invaluable in understanding how those animals organize socially and communicate with one another. The anthropologist Jane Goodall,(image below) for example, spent nearly five decades observing the behavior of chimpanzees in Africa. As an illustration of the types of concerns that a researcher might encounter in naturalistic observation, some scientists criticized

Goodall for giving the chimps names instead of referring to them by numbers—using names was thought to undermine the emotional detachment required for the objectivity of the study (McKie, 2010).

Jane Goodall made a career of conducting naturalistic observations of chimpanzee behavior.

The greatest benefit of naturalistic observation is the validity, or accuracy, of information collected unobtrusively in a natural setting. Having individuals behave as they normally would in a given situation means that we have a higher degree of ecological validity, or realism, than we might achieve with other research approaches. Therefore, our ability to **generalize** the findings of the research to real-world situations is enhanced. If done correctly, we need not worry about people or animals modifying their behavior simply because they are being observed. Sometimes, people may assume that reality programs give us a glimpse into authentic human behavior. However, the principle of inconspicuous observation is violated as reality stars are followed by camera crews and are interviewed on camera for personal confessionals. Given that

environment, we must doubt how natural and realistic their behaviors are.

The major downside of naturalistic observation is that they are often difficult to set up and control. In our restroom study, what if you stood in the restroom all day prepared to record people's hand washing behavior and no one came in? Or, what if you have been closely observing a troop of gorillas for weeks only to find that they migrated to a new place while you were sleeping in your tent? The benefit of realistic data comes at a cost. As a researcher you have no control of when (or if) you have behavior to observe. In addition, this type of observational research often requires significant investments of time, money, and a good dose of luck.

Sometimes studies involve **structured observation**. In these cases, people are observed while engaging in set, specific tasks. An excellent example of structured observation comes from the Strange Situation by Mary Ainsworth (you will read more about this later). The Strange Situation is a procedure used to evaluate attachment styles that exist between an infant and caregiver. In this scenario, caregivers bring their infants into a room filled with toys. The Strange Situation involves a number of phases, including a stranger coming into the room, the caregiver leaving the room, and the caregiver's return to the room. The infant's behavior is closely monitored at each phase, but it is the behavior of the infant upon being reunited with the caregiver that is most telling in terms of characterizing the infant's attachment style with the caregiver.

Another potential problem in observational research is **observer bias**. Generally, people who act as observers are closely involved in the research project and may unconsciously skew their observations to fit their research goals or expectations. To protect against this type of bias, researchers should have clear criteria established for the types of behaviors recorded and how those behaviors should be classified. In addition, researchers often compare observations of the same event by multiple observers, in order to test **inter-rater**

reliability: a measure of reliability that assesses the consistency of observations by different observers.[6]

Survey Methodology

Surveys are familiar to most people because they are so widely used. Surveys enhance accessibility to subjects because they can be conducted in person, over the phone, through the mail, or online. A survey involves asking a standard set of questions to a group of subjects. In a highly structured survey, subjects are forced to choose from a response set such as "strongly disagree, disagree, undecided, agree, strongly agree"; or "0, 1-5, 6-10, etc." Surveys are commonly used by sociologists, marketing researchers, political scientists, therapists, and others to gather information on several variables in a relatively short period of time. Surveys typically yield surface information on a wide variety of factors but may not allow for in-depth understanding of human behavior. Of course, surveys can be designed in a number of ways. They may include **forced choice questions** and **semi-structured questions** in which the researcher allows the respondent to describe or give details about certain events. One of the most difficult aspects of designing a good survey is wording questions in an unbiased way and asking the right questions so that respondents can give a clear response rather that choosing "undecided" each time. Knowing that 30% of respondents are undecided is of little use! So, a lot of time and effort should be placed on the construction of survey items. One of the benefits of having forced choice items is that each response is coded so that the results can be quickly entered and analyzed using statistical software. Analysis takes much longer when respondents

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give lengthy responses that must be analyzed in a different way. Surveys are useful in examining stated values, attitudes, opinions, and reporting on practices. However, they are based on self-report or what people say they do rather than on observation and this can limit accuracy.[7]

1. Please rate the following on a scale of one to five, based on whether or not you think that question should be addressed in our next international skypecast.						
	Don't even consider this	It would be better if you don't discuss this	Neutral: I don't care if you talk about this	Probably talk about this	Definitely talk about this	Response Average
Is there hope for systemic school reform in the United States? Elsewhere in the world?	0% (0)	10% (1)	50% (5)	10% (1)	30% (3)	3.60
Should schools repurpose their existing educational technology budgets, which largely serve now to support a traditional transmission-based model (pedagogy) of instruction?	0% (0)	0% (0)	0% (0)	60% (6)	40% (4)	4.40
David Warlick talks about telling a new story. I'd like to see us more clearly define it. Is this new future just an amalgamation of new, untried solutions (e.g. digital storytelling, blogging, podcasting, wikis, etc)? How do these fundamentally transform teaching, learning and leadership aside from serving as a big distraction?	0% (0)	0% (0)	0% (0)	30% (3)	70% (7)	4.70
How can you or I be symbols of hope and light in an increasingly darkening world that has lost its enthusiasm for expensive technology initiatives?	0% (0)	10% (1)	0% (0)	50% (5)	40% (4)	4.20
How can we transform the landscape from our unique perspectives in higher ed, adult ed, K-12 and central administration?	0% (0)	0% (0)	10% (1)	60% (6)	30% (3)	4.20
					Total Respondents	10
					(skipped this question)	0

2. What other question would you like to see us address not included in the list above?
1. How can we reconcile technology integration with standardized testing?
2. Please discuss funding possibilities for teacher inservices so that we can learn enough to use this stuff!
3. How do we go about promoting both Action Research in the classroom and published Journal articles via Universities, into the benefits/costs of Web 2.0 in the classroom?
4. Maybe we should sell Lance Armstrong type bracelets to put educational vision with the uses of technology in the face of the public.
5. What is the best model of teacher professional development to equip them with the skills and tools needed to make a difference despite the restrictions of time, new curriculum implementation, NCLB, etc.? How can we equip pre-service teachers with these types of tools as well?
6. Should 21st century literacy skills be tested like other things (including reading, writing and math) on high-stakes examinations? Should there be mandatory standards that are assessed for technology skills?

The above survey asks questions about school reform [footnote]"Skypecast Survey" by Wesley Fryer is licensed under CC BY-SA 2.0[/footnote]

Interviews

Rather than surveying participants, they can be **interviewed** which means they are directly questioned by a researcher. Interviewing

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participants on their behaviors or beliefs can solve the problem of misinterpreting the questions posed on surveys. The examiner can explain the questions and further probe responses for greater clarity and understanding. Although this can yield more accurate results, interviews take longer and are more expensive to administer than surveys. Participants can also demonstrate social desirability, which will affect the accuracy of the responses.

An infant wearing a skull-cap that contains electrodes during an event-related potential (ERP) recording.

Psychophysiological Assessment

Researchers may also record **psychophysiological data**, such as measures of heart rate, hormone levels, or brain activity to help

explain development. These measures may be recorded by themselves or in combination with behavioral data to better understand the bidirectional relations between biology and behavior. Special equipment has been developed to allow researchers to record the brain activity of infants and children. One manner of understanding associations between brain development and behavioral advances is through the recording of **event-related potentials** (ERPs). ERPs are recorded by fitting a research participant with a stretchy cap that contains many small sensors or **electrodes**. These electrodes record tiny electrical currents on the scalp of the participant in response to the presentation of stimuli, such as a picture or a sound.

The use of ERPs has provided important insight as to how infants and children understand the world around them. Webb, Dawson, Bernier, and Panagiotides (2006) examined face and object processing in children with autism spectrum disorders, those with developmental delays, and those who were typically developing. The children wore electrode caps and had their brain activity recorded as they watched still photographs of faces of their mother or of a stranger, and objects, including those that were familiar or unfamiliar to them. The researchers examined differences in face and object processing by group by observing a component of the brainwaves. Findings suggest that children with autism are in some way processing faces differently than typically developing children and those with more general developmental delays.

## Secondary/Content Analysis or Archival Research

Secondary/content analysis or **archival** research involves analyzing information that has already been collected or examining documents or media to uncover attitudes, practices or preferences. There are many data sets available to those who wish to conduct this type of research. For example, the U. S. Census Data is available

and widely used to look at trends and changes taking place in the United States. The researcher conducting secondary analysis does not have to recruit subjects but does need to know the quality of the information collected in the original study.

Correlational Research

In contrast to descriptive research, which is designed primarily to provide static pictures, **correlational** research involves the measurement of two or more variables (a variable is anything that can change in value) and an assessment of the relationship between or among those variables. For instance, the variables of height and weight are systematically related (correlated) because taller people generally weigh more than shorter people.

   The Pearson Correlation Coefficient, symbolized by the letter r, is the most common statistical measure of the strength of linear relationships among variables. The value of the correlation coefficient ranges from r= −1.00 to r = 1.00. The strength of the linear relationship is indexed by the distance of the correlation coefficient from zero (its absolute value). For instance, r = −.54 is a stronger relationship than r= .30, and r = .72 is a stronger relationship than r = −.57. The direction of the linear relationship is indicated by the sign of the **correlation coefficient**. Positive values of r (such as r = .54 or r = .67) indicate that the relationship is positive (i.e., the pattern of the dots on the **scatter plot** runs from the lower left to the upper right), whereas negative values of r (such as r = −.30 or r = −.72) indicate negative relationships (i.e., the dots run from the upper left to the lower right).

(a)

Positive linear
$r = +.82$

(b)

Negative linear
$r = -.70$
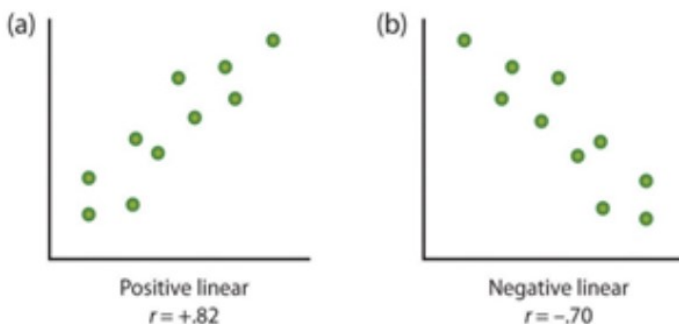
Examples of positive and negative correlational data presented as scatterplots

When the straight line indicates that individuals who have high values for one variable also tend to have high values for the other variable, as in part (a) above, the relationship is said to be a **positive correlation**. Examples of positive correlations include those between education and income, and between age and mathematical abilities in children. In each case people who score higher on one of the variables also tend to score higher on the other variable. **Negative correlations**, in contrast, as shown in part (b) above, occur when high values for one variable tend to be associated with low values for the other variable. Examples of negative correlations include those between the age of a child and the number of diapers the child uses, and between practice and errors made on a learning task. In these cases, people who score higher on one of the variables tend to score lower on the other variable.[8]

An example of how a **scatterplot** might look in the case where a study finds that kindergarten and elementary school children who were better at rhymes and hearing the sounds of individual letters

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before they started to read later learn to read words more quickly than children who were not as good with making an distinguishing elementary sounds of language can be found below.
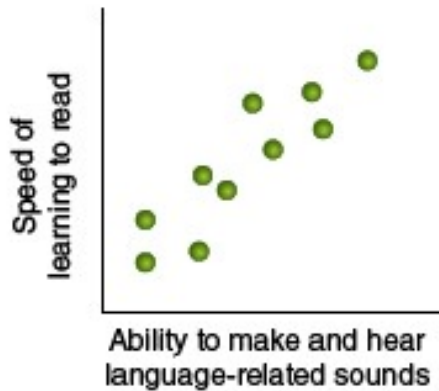
Scatterplot showing the relationship between the Speed of Learning to Read and the Ability to Make and Hear Language-Related Sounds[9]

An important limitation of correlational research designs is that they cannot be used to draw conclusions about the causal relationships among the measured variables. In other words, CORRELATION IS NOT CAUSATION. Consider, for instance, a researcher who has hypothesized that viewing violent behavior will

9. From Lumenlearning, Introduction to Psychology Module 2: Psychological research is licensed under CC BY SA 4.0

cause increased aggressive play in children. He has collected, from a sample of fourth-grade children, a measure of how much violent television each child views during the week, as well as a measure of how aggressively each child plays. The researcher discovers a positive correlation between the two measured variables. Although this positive correlation appears to support the hypothesis, it cannot be taken to indicate that viewing violent television causes aggressive behavior or aggressive behavior causes one to view violent television. Another possible explanation for the observed correlation is that it has been produced by the presence of a third variable.

A third or **extraneous variable** is a variable that is not part of the research hypothesis but produces the observed correlation between them. In our example a potential third variable is the discipline style of the children's parents. Parents who use a harsh and punitive discipline style may produce children who both like to watch violent television and who behave aggressively in comparison to children whose parents use less harsh discipline.

For this reason, we are left with the basic limitation of correlational research: Correlation does not demonstrate causation! It is important that when you read about correlational research projects, you keep in mind the possibility of third variables.

Strengths and limitations of Correlational Research

Correlational research can be used when experimental research is not possible because the variables either cannot be manipulated, or it would be unethical to use an experiment. Correlational designs also have the advantage of allowing the researcher to study behavior as it occurs in everyday life. We can also use correlational designs to make predictions. For instance, we can predict from the scores on a battery of tests the success of job trainees during a training

session. However, we cannot use such correlational information to determine whether one variable caused another variable. For that, researchers rely on an experiment.

Experimental Research

In order to conduct an experiment, a researcher must have a specific hypothesis to be tested. As you've learned, hypotheses can be formulated either through direct observation of the real world or after careful review of previous research. For example, if you think that children should not be allowed to watch violent programming on television because doing so would cause them to behave more violently, then you have basically formulated a hypothesis—namely, that watching violent television programs causes children to behave more violently. How might you have arrived at this particular hypothesis? You may have younger relatives who watch cartoons featuring characters using martial arts to save the world from evildoers, with an impressive array of punching, kicking, and defensive postures. You notice that after watching these programs for a while, your young relatives mimic the fighting behavior of the characters portrayed in the cartoon.

These sorts of personal observations are what often lead us to formulate a specific hypothesis, but we cannot use limited personal observations and anecdotal evidence to rigorously test our hypothesis. Instead, to find out if real-world data supports our hypothesis, we have to conduct an experiment.[10]

Three conditions must be met to establish cause and effect. Experimental designs are useful in meeting these conditions.

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1. The **independent variable** and the **dependent variable** must be related. In other words, when one is altered, the other changes in response. (The independent variable is something altered or introduced by the researcher. The dependent variable is the outcome that is measured, or the factor affected by the introduction of the independent variable. For example, if we are looking at the impact of different levels of intervention on reading scores, the independent variable would be the level of intervention and the dependent variable would be the reading scores.)

2. The cause must come before the effect. Experiments involve measuring subjects on the dependent variable before exposing them to the independent variable (establishing a baseline). So, we would measure the subjects' level of reading before introducing the intervention program and then again after the intervention program to see if there has been a change in reading scores. (Observational and survey research does not always allow us to look at the timing of these events, which makes understanding causality problematic with these designs.)

3. The cause must be isolated. The researcher must ensure that no outside, perhaps unknown or confounding variables are causing the effect we see. The experimental design helps make this possible. In an experiment, we would make sure that our subjects did not receive any intervention at home or at an after-school program. Otherwise these additional interventions might influence reading scores. [11]

11. Lifespan Development: A Psychological Perspective 2nd Edition by Martha Lally and Suzanne Valentine-French is licensed under CC BY-NC-SA 3.0 (modified by Maria Pagano)

Designing an Experiment

The most basic experimental design involves two groups: the **experimental group** and the **control group**. The two groups are designed to be the same except for one difference— experimental manipulation. The experimental group gets the experimental manipulation—that is, the treatment or variable being tested (in this case, violent TV images)—and the control group does not. Since experimental manipulation is the only difference between the experimental and control groups, we can be sure that any differences between the two are due to experimental manipulation rather than chance.

In our example of how violent television programming might affect violent behavior in children, we have the experimental group view violent television programming for a specified time and then measure their violent behavior. We measure the violent behavior in our control group after they watch nonviolent television programming for the same amount of time. It is important for the control group to be treated similarly to the experimental group, with the exception that the control group does not receive the experimental manipulation. Therefore, we have the control group watch non-violent television programming for the same amount of time as the experimental group.

We also need to precisely define, or operationalize, what is considered violent and nonviolent. An **operational definition** is a description of how we will measure our variables, and it is important in allowing others understand exactly how and what a researcher measures in a particular experiment. In operationalizing violent behavior, we might choose to count only physical acts like kicking or punching as instances of this behavior, or we also may choose to include angry verbal exchanges. Whatever we determine, it is important that we operationalize violent behavior in such a way that anyone who hears about our study for the first time knows exactly what we mean by violence. This aids peoples' ability to interpret our

data as well as their capacity to repeat our experiment should they choose to do so.

Once we have operationalized what is considered violent television programming and what is considered violent behavior from our experiment participants, we need to establish how we will run our experiment. In this case, we might have participants watch a 30-minute television program (either violent or nonviolent, depending on their group membership) before sending them out to a playground for an hour where their behavior is observed and the number and type of violent acts is recorded.

Ideally, the people who observe and record the children's behavior are unaware of who was assigned to the experimental or control group, in order to control for experimenter bias. **Experimenter bias** refers to the possibility that a researcher's expectations might skew the results of the study. Remember, conducting an experiment requires a lot of planning, and the people involved in the research project have a vested interest in supporting their hypotheses. If the observers knew which child was in which group, it might influence how much attention they paid to each child's behavior as well as how they interpreted that behavior. By being blind to which child is in which group, we protect against those biases. This situation is a **single-blind study**, meaning that one of the groups (participants) are unaware as to which group they are in (experiment or control group) while the researcher who developed the experiment knows which participants are in each group.

In a **double-blind study**, both the researchers and the participants are blind to group assignments. Why would a researcher want to run a study where no one knows who is in which group? Because by doing so, we can control for both experimenter and participant expectations. If you are familiar with the phrase placebo effect, you already have some idea as to why this is an important consideration. The **placebo effect** occurs when people's expectations or beliefs influence or determine their experience in a given situation. In other words, simply expecting something to happen can actually make it happen.

The placebo effect is commonly described in terms of testing the effectiveness of a new medication. Imagine that you work in a pharmaceutical company, and you think you have a new drug that is effective in treating depression. To demonstrate that your medication is effective, you run an experiment with two groups: The experimental group receives the medication, and the control group does not. But you don't want participants to know whether they received the drug or not.

Why is that? Imagine that you are a participant in this study, and you have just taken a pill that you think will improve your mood. Because you expect the pill to have an effect, you might feel better simply because you took the pill and not because of any drug actually contained in the pill—this is the placebo effect.

To make sure that any effects on mood are due to the drug and not due to expectations, the control group receives a placebo (in this case a sugar pill). Now everyone gets a pill, and once again neither the researcher nor the experimental participants know who got the drug and who got the sugar pill. Any differences in mood between the experimental and control groups can now be attributed to the drug itself rather than to experimenter bias or participant expectations.[12]

Independent and Dependent Variables

In a research experiment, we strive to study whether changes in one thing cause changes in another. To achieve this, we must pay attention to two important variables, or things that can be changed, in any experimental study: the **independent variable** and the **dependent variable**. An independent variable is manipulated or controlled by the experimenter. In a well-designed experimental

12. From Lumenlearning, Introduction to Psychology Module 2: Psychological research   is licensed under CC BY SA 4.0

study, the independent variable is the only important difference between the experimental and control groups. In our example of how violent television programs affect children's display of violent behavior, the independent variable is the type of program—violent or nonviolent—viewed by participants in the study (Figure 3). A dependent variable is what the researcher measures to see how much effect the independent variable had. In our example, the dependent variable is the number of violent acts displayed by the experimental participants.
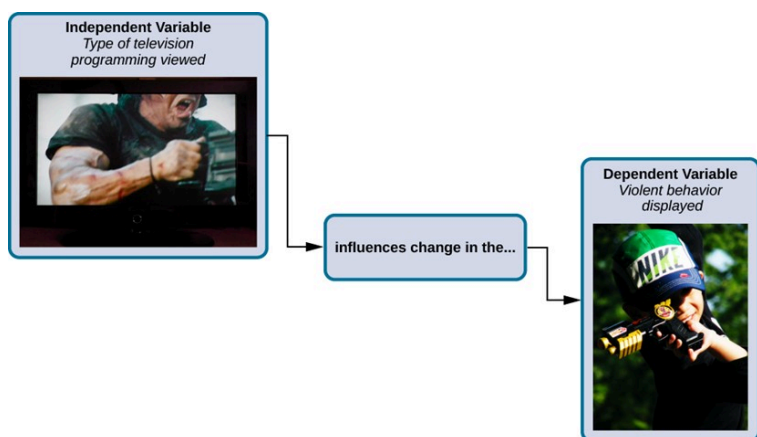
In an experiment, manipulations of the independent variable are expected to result in changes in the dependent variable. (credit "automatic weapon": modifications of work by Daniel Oines: credit "toy gun": modifications of work by Emran Kassim)

In an experiment, manipulations of the **independent variable** are expected to result in changes in the **dependent variable**. (credit "automatic weapon": modifications of work by Daniel Oines: credit "toy gun": modifications of work by Emran Kassim)

We expect that the dependent variable will change as a function of the independent variable. In other words, the dependent

variable *depends* on the independent variable. A good way to think about the relationship between the independent and dependent variables is with this question: What effect does the independent variable have on the dependent variable? Returning to our example, what effect does watching a half hour of violent television programming or nonviolent television programming have on the number of incidents of physical aggression displayed on the playground?

Selecting and Assigning Experimental Participants

Now that our study is designed, we need to obtain a sample of individuals to include in our experiment. Our study involves human participants so we need to determine who to include. **Participants** are the subjects of psychological research, and as the name implies, individuals who are involved in psychological research actively participate in the process. Often, psychological research projects rely on college students to serve as participants. In fact, the vast majority of research in psychology subfields has historically involved students as research participants (Sears, 1986; Arnett, 2008). But are college students truly representative of the general population? College students tend to be younger, more educated, more liberal, and less diverse than the general population. Although using students as test subjects is an accepted practice, relying on such a limited pool of research participants can be problematic because it is difficult to generalize findings to the larger population.

Our hypothetical experiment involves children, and we must first generate a sample of child participants. Samples are used because populations are usually too large to reasonably involve every member in our particular experiment. If possible, we should use a **random sample** (there are other types of samples, but for the purposes of this section, we will focus on random samples). A random sample is a subset of a larger population in which every

member of the population has an equal chance of being selected. Random samples are preferred because if the sample is large enough, we can be reasonably sure that the participating individuals are representative of the larger population. This means that the percentages of characteristics in the sample—sex, ethnicity, socioeconomic level, and any other characteristics that might affect the results—are close to those percentages in the larger population.

In our example, let's say we decide our population of interest is fourth graders. But all fourth graders is a very large population, so we need to be more specific; instead we might say our population of interest is all fourth graders in a particular city. We should include students from various income brackets, family situations, races, ethnicities, religions, and geographic areas of town. With this more manageable population, we can work with the local schools to**randomly select** around 200 fourth graders who we want to participate in our experiment.

In summary, because we cannot test all of the fourth graders in a city, we want to find a group of about 200 that reflects the composition of that city. With a representative group, we can generalize our findings to the larger population without fear of our sample being biased in some way.

Now that we have a sample, the next step of the experimental process is to split the participants into experimental and control groups through random assignment. With **random assignment**, all participants have an equal chance of being assigned to either group. There is statistical software that will randomly assign each of the fourth graders in the sample to either the experimental or the control group.

Random assignment is critical for sound experimental design. With sufficiently large samples, random assignment makes it unlikely that there are systematic differences between the groups. So, for instance, it would be very unlikely that we would get one group composed entirely of males, a given ethnic identity, or a given religious ideology. This is important because if the groups were systematically different before the experiment began, we would not

know the origin of any differences we find between the groups: Were the differences preexisting, or were they caused by manipulation of the independent variable? Random assignment allows us to assume that any differences observed between experimental and control groups result from the manipulation of the independent variable.[13]

Despite the advantage of determining causation, experiments do have limitations. One is that they are often conducted in laboratory situations rather than in the everyday lives of people. Therefore, we do not know whether results that we find in a laboratory setting will necessarily hold up in everyday life. Second, and more important, is that some of the most interesting and key social variables cannot be experimentally manipulated because of ethical concerns. If we want to study the influence of abuse on children's development of depression, these relationships must be assessed using correlational designs because it is simply not ethical to experimentally manipulate these variables. Characteristics of descriptive, correlational, and experimental research designs can be found in the following table.[14],[15]

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14. Lifespan Development: A Psychological Perspective 2nd Edition by Martha Lally and Suzanne Valentine-French is licensed under CC BY-NC-SA 3.0 (modified by Maria Pagano)
15. Table created by Stangor, C. can be found on Canvas Network and is licensed under CC BY SA 3.0[19] Lifespan Development by Lumen Learning is licensed under CC BY 4.0 (modified by Maria Pagano)

Research Design	Goal	Advantages	Disadvantages
Descriptive	To create a snapshot of the current state of affairs	Provides a relatively complete picture of what is occurring at a given time. Allows the development of questions for further study.	Does not assess relationships among variables. May be unethical if participants do not know they are being observed.
Correlational	To assess the relationships between and among two or more variables	Allows testing of expected relationships between and among variables and the making of predictions. Can assess these relationships in everyday life events.	Cannot be used to draw inferences about the causal relationships between and among the variables.
Experimental	To assess the causal impact of one or more experimental manipulations on a dependent variable	Allows drawing of conclusions about the causal relationships among variables.	Cannot experimentally manipulate many important variables. May be expensive and time consuming.

Source: Stangor, C. (2011). *Research methods for the behavioral sciences* (4th ed.). Mountain View, CA: Cengage.

Table describing the type of research design with corresponding goal, advantages, and disadvantages.

Developmental Research Designs

While research methods are tools that are used to collect information, research design is the strategy or blueprint for deciding how to collect and analyze information. Research design dictates which research methods are used and how. When we are trying to describe development and change, the research designs become especially important because we are interested in what changes and what stays the same with age.[19] Developmental researchers typically use one of three types of developmental research design, either **cross-sectional**, **longitudinal**, or **cross-sequential/sequential**.

Cross-Sectional, Longitudinal and Cross Sequential/Sequential Research Designs

Cross Sectional Research Designs

Cross-sectional research compares samples that represent a cross-section of the population who vary in age. Participants might be asked to complete a survey or take a test of some physical or cognitive skill. The attitudes or skill levels based on age are compared. In cross-sectional research, respondents are measured only once, and consequently this method is not expensive or time consuming. In addition, because participants are only tested at one point in time, practice effects are not an issue as children do not have the opportunity to become better at the task over time. There is also no need to keep in contact with, or follow-up with, participants over time. The table[16] below shows that the study included a group of 2-year-olds, a group of 6-year-olds and a group of 8-year-olds.

16. Image by NOBA is licensed under CC BY-NC-SA 4.0

Year of Study - 2004
Cohort A - 2-year-olds
Cohort B - 6-year-olds
Cohort C - 8-year-olds

The table shows the three different Cohort Groups (Cohort A, Cohort B, and Cohort C) and the age ranges of each cohort group that took part in the study.

However, cross-sectional research does not allow the researcher to look at the impact of having been born in a certain time-period, which is known as the **cohort effect**. For example, those born during the depression have very different views about and experiences with the internet than those born in the last twenty years. Different attitudes about the Internet, for example, might not be due to a person's biological age as much as their life experiences as members of a cohort.[17]

Longitudinal Research Designs

Longitudinal research involves studying a group of people who

17. Lifespan Development: A Psychological Perspective 2nd Edition by Martha Lally and Suzanne Valentine-French is licensed under CC BY-NC-SA 3.0

are the same age and measuring them repeatedly over a period-of-time. This type of design allows researchers to study individual differences in development. Longitudinal studies may be conducted over the short term, such as a span of months, or over much longer durations including years or decades. For these reasons, longitudinal research designs are optimal for studying stability and change over time.

This illustration shows how one child takes part in the study when he or she is 2, 4, 6, and 8 years of age [footnote]Image by NOBA is licensed under CC BY-NC-SA 4.0[/footnote]

Problems with longitudinal research include being very time consuming and expensive. Researchers must maintain continued contact with participants over time, and these studies necessitate that scientists have funding to conduct their work over extended durations. An additional risk is attrition. Attrition occurs when participants fail to complete all portions of a study. Participants may move, change their phone numbers, or simply become disinterested in participating over time. Researchers should account for the possibility of attrition by enrolling a larger sample into their study initially, as some participants will likely drop out over time. Even with a large sample size, the experimenter never knows if there was something different about the individuals who dropped out versus those that remained in the study.

The results from longitudinal studies may also be impacted by repeated assessments. Consider how well you would do on a math test if you were given the exact same exam every day for a week. Your performance would likely improve over time not necessarily

because you developed better math abilities, but because you were continuously practicing the same math problems. This phenomenon is known as a practice effect. Practice effects occur when participants become better at a task over time because they have done it again and again; not due to natural psychological development.[18]

Cross-Sequential/Sequential Designs

Cross-sequential research includes elements of both longitudinal and cross-sectional research designs. Like longitudinal designs, sequential research features participants who are followed over time; like cross-sectional designs, sequential work includes participants of different ages. This research design is also distinct from those that have been discussed previously in that individuals of different ages are enrolled into a study at various points in time to examine age-related changes, development within the same individuals as they age, and account for the possibility of cohort effects.[19]

18. Lifespan Development: A Psychological Perspective 2nd Edition by Martha Lally and Suzanne Valentine-French is licensed under CC BY-NC-SA 3.0
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	2002	2004	2006
Cohort A	Age 2	Age 4	Age 6
Cohort B	--	Age 2	Age 4
Cohort C	--	--	Age 2
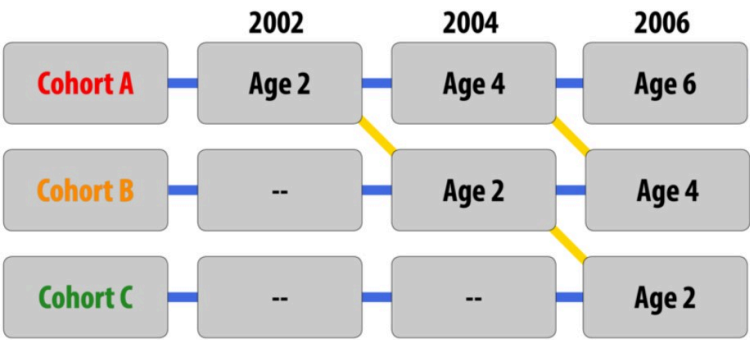
The table above diagrams the discussion of sequential designs that is found below. [footnote]Image by NOBA is licensed under CC BY-NC-SA 4.0[/footnote]

For example, in a study with a sequential design, a researcher might enroll three separate groups of children (Groups A, B, and C). Children in Group A would be enrolled when they are 2 years old and would be tested again when they are 4 and 6 years old. This is similar in design to the longitudinal study described previously. Children in Group B would also be enrolled when they are 2 years old, but this would occur two years later when Group A is now 4 years old. Finally, children in Group C would be enrolled when they are 2 years old and Group A is now 6 and Group B is now 4. At this time, the children would represent a cross-sectional design (2, 4, and 6 years of age). Further, along the diagonal children of the same age can be compared to determine if cohort effects are evident. Sequential designs are appealing because they allow researchers to learn a lot about development in a relatively short amount of time.

Because they include elements of longitudinal and cross-sectional designs, sequential research has many of the same strengths and limitations as these other approaches. For example, sequential work may require less time and effort than longitudinal research, but more time and effort than cross-sectional research. Although practice effects may be an issue if participants are asked

to complete the same tasks or assessments over time, attrition may be less problematic than what is commonly experienced in longitudinal research since participants may not have to remain involved in the study for such a long period-of-time.[20] The table that follows summarizes the advantages and disadvantages of developmental research designs.

	Advantages	Disadvantages
Longitudinal	• Examines changes within individuals over time • Provides a developmental analysis	• Expensive • Takes a long time • Participant attrition • Possibility of practice effects • Cannot examine cohort effects
Cross-sectional	• Examines changes between participants of different ages at the same point in time • Provide information on age-related change	• Cannot examine change over time • Cannot examine cohort effects
Sequential	• Examines changes within individuals over time • Examines changes between participants of different ages at the same point in time • Can be used to examine cohort effects	• May be expensive • Possibility of practice effects

Advantages and Disadvantages of Developmental Research Designs [27]

Preferential Looking and Habituation

Conducting psychological experiments that involve infant participants can be difficult. Infants may fall asleep or cry during

20. Lifespan Development: A Psychological Perspective 2nd Edition by Martha Lally and Suzanne Valentine-French is licensed under CC BY-NC-SA 3.0[27] Image by NOBA is licensed under CC BY-NC-SA 4.0

procedures, and typically do not follow instructions well. The most difficult aspect of working with infants is their lack of language abilities. In other words, infants can't tell you what they think, believe, or feel like adults can. However, infant visual capabilities while not as developed as older children or adults can be used to provide researchers with insights into their cognitive abilities.

Preferential Looking

In 1961 Robert L. Fantz introduced the **visual preference paradigm**. The technique was simple, show infants two different stimuli paired alongside each other and measure how long the infant would look at either stimulus. Fantz concluded that the stimulus the infants looked longer at was the preferred stimulus. As he continued his technique, he began to find similar preference patterns among infants. For example, Fantz showed that from 2 months of age, infants preferred complex images like bulls-eyes over plain white or black circles. One of his more interesting findings is that newborns and infants prefer faces and face-like patterns over non-face-like patterns. This finding led Fantz to hypothesize that this preference was an innate ability that might serve to enhance survival of the newborn and infant.

The "Looking Chamber" developed by Fantz (1961) to test newborn and infant preference. [footnote]Fair Use: Image from Perkins School for the Blind eLEARNING[/footnote]

The **preferential looking technique** can be used to test infant visual acuity. In this case infants are shown several presentations of different stimuli consisting of black and white stripes of varying widths alongside a control stimulus (a uniform grey disc). When the looking time between the two stimuli is approximately 50% for either stimulus the infant's visual acuity limit has been reached.

Finally, the concept behind the preferential looking technique have been adapted for use in the study of audition. The head-turn preference procedure (HPP) or preferential listening paradigm is used to explore infants' ability to discriminate between auditory stimuli.

Testing an infant's visual acuity using preferential looking. The width of the stripes corresponds to Snellen Acuity values. [21]

Habituation

Fantz was one of the first researchers to make use of the **habituation technique** (although he did not refer to the technique as "habituation) to study human infant perceptual and cognitive abilities.

21. Fair Use: Image from Perkins School for the Blind eLEARNING

In habituation studies, infants are presented with a stimulus such as a photograph of a face over several trials until they become bored with it. Typically, when infants become bored, they will look away from the picture. Once the infant has been habituated, or bored, a new or test stimulus is then paired with the original stimulus. Therefore, if the infant is shown a new picture–such as a photograph of a different face paired with the original picture, their interest will return, and they will look longer at the new picture. This is a phenomenon known as dishabituation. Habituation procedures work because infants generally look longer at novel stimuli relative to items that are familiar to them. This research technique takes advantage of involuntary or obligatory responses because infants are constantly looking around and observing their environments; they do not have to be taught to engage with the world in this way.[22]

Types of Habituation Protocols

Fixed Trial Habituation Protocols and the Infant-Controlled Procedure

The simplest habituation protocols are **fixed trial (FT) procedures**, which involve administering a set of discrete, repetitive stimulus presentations to an infant; each trial has a fixed duration, and a fixed inter-trial interval. For example, one might present 8 trials of a checkerboard to an infant, each lasting 10 s with a 10 s inter-trial interval (e.g., Colombo et al., 1997). In simple FT protocols,

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22. Research Methods in Developmental Psychology by Angela Lukowski and Helen Milojevich is licensed under CC BY NC SA 4.0 (modified by Maria Pagano

the presentations are in no way linked to, or contingent upon, the infant's behavior or visual attention; the infant is free to look or not look at the stimulus, and the procedure continues. There are a number of distinct advantages to running FT procedures: they are easy to automate, easy to conduct, and they yield data that are simple, uniform for each subject, and easy to analyze. The drawback of FT protocols, however, is that individual infants may habituate at different rates. To the degree that habituation rate reflects stimulus encoding (a central tenet of the comparator model), this implies that at the end of the FT protocol, infants may be at very different levels of processing. For instance, in the example described above (8 trials at 10 seconds each), infants might have looked for as much as 80 seconds and as little as 0 seconds. If one is interested in individual differences in infant processing, this may well be desirable (presuming that the infant has, in fact, looked at the stimulus), as it becomes analogous to a speeded cognitive task, where subjects are given a limited amount of time or exposure to an item before being administered a probe. However, if the aim of the protocol is to demonstrate a generic infant ability or skill, individual and developmental differences in visual behavior may obscure group effects that one is seeking to establish.[23]

This problem is addressed by the development of the **infant-controlled procedure** (ICP; Horowitz et al., 1972). There are two major differences between this procedure and the fixed trial protocol. The first is that the infant is administered repetitive stimulus presentations, but the beginning and end of the trial is contingent upon the infant's looking. That is, the trial is not considered to start until the infant has looked at the stimulus, and it is terminated when the infant looks away.

Second, the trials continue until the infant has reduced his/her looking to some criterion. This criterion may be absolute (e.g., the

23. Infant Visual Habituation by John Colombo and D. Wayne Mitchell Source: U.S. National Library of Medicine.

sessions may end when the infant looks for a total of, say, no more than 3 seconds), but more often the criterion is relative to the infant's initial level of looking. For example, the infant may be required to show a decline to a particular percentage (typically 50%) of their initial or longest levels. It should be noted that the use of a relative criterion makes theoretical sense from the point of view of the comparator model; if the initial size of the OR (i.e., the length of the look) represents the response when there is no internal representation of the stimulus, then using a constant percentage of decline as a criterion for habituation theoretically equates all of the subjects for the extent to which the external stimulus is encoded. We note that this reasoning is based on a set of assumptions with regard to looking and the OR, but it is also reasonable to point out that the ICP works extremely well in practice.

There are several other issues to consider with respect to the ICP, however. The first one is that this procedure is more difficult to design and implement than the FT protocol. Because criteria are computed, set, and typically reset several times within a session (based on the looks that the infant makes to the stimulus), it is difficult to conduct this without the aid of a microcomputer and custom programming.

Second, there are many decisions to be made about the parameters of the habituation protocol, for which there are neither consensual standards nor empirical evidence to guide the investigator. These decisions also complicate the programming for the administration of the task. Group habituation curves will mislead many novice investigators into thinking that the first look of a habituation sequence is always the longest one. In fact, however, this occurs only about 60% of the time (Colombo & Mitchell, 1990). Thus, it is common to encounter long looks quite late in the habituation session, and if the habituation criterion is rigidly set by the length of the initial looks, infants will continue on in the session longer than necessary or may fail to attain the habituation criterion at all. In response to this, many investigators choose to allow the

habituation criterion to "float," or to be reset when longer looks occur later (i.e., beyond the first or second look) in the habituation sequence. In addition, the number of looks on which the criterion is based can vary; it may be based on the longest look, or the average of the two longest looks, or so forth. Similar issues must be faced when choosing how many criterion looks must be elicited to consider the infant to have habituated; here, the standard used by most investigators is two consecutive looks at or below criterion, but there is no empirical justification for this. accepted standard.

Third, the ICP dictates that the coding of looks must be done online, because the criterion for habituation is based on the duration of looks that have been observed earlier in the session. This has some implications for the reliability of online coding, but the coding of looks using the corneal reflection technique (or other less restrictive judgment criteria) tends to be quite easy and reliable. However, because the individual "look" now serves as the primary datum within the session, one must decide what constitutes a "look." It is possible to place no constraints on the definition of a look; that is, to count any look to the stimulus as valid for purposes of setting or reaching the habituation criterion. However, one finds quickly that this may yield sequences of brief looks that result in very brief stimulus presentations that interfere with encoding; in addition, such looks may make it difficult to attain the habituation criterion, and have lower reliability (Colombo & Horowitz, 1985). In response, most investigators constrain the definition of looks in the ICP; looks must be of some minimum length (usually 1 or 2 sec) to be counted as valid, and be terminated by some minimum (again, 1 or 2 sec) look away from the stimulus. One of the few empirical evaluations of these procedural parameters, Colombo and Horowitz (1985) found 1 sec to be optimal for both the minimum look length and for the interval to characterize look termination, although this evidence has engendered little/no adoption of these standards, and no research has been conducted to determine whether different parameters might be appropriate for different aged infants.

Finally, it should be noted that like all criterion-based learning

paradigms, the ICP will yield data sets that are not uniform in length for all participants; one infant may attain the habituation criterion in 5 looks, while another may take 25 looks to attain the criterion. As a result, the data structures for such files are not readily amenable to conventional forms of analysis and require considerable forethought in arranging.[24]

Conducting Ethical Research

As a student of psychological science, you may already know that **Institutional Review Boards (IRBs)** review and approve all research projects that are conducted at universities, hospitals, and other institutions. An IRB is typically a panel of experts who read and evaluate proposals for research. IRB members want to ensure that the proposed research will be carried out ethically and that the potential benefits of the research outweigh the risks and harm for participants. What you may not know though, is that the IRB considers some groups of participants to be more vulnerable or at-risk than others. Whereas university students are generally not viewed as vulnerable or at-risk, infants and young children commonly fall into this category. What makes infants and young children more vulnerable during research than young adults? One reason infants and young children are perceived as being at increased risk is due to their limited cognitive capabilities, which makes them unable to state their willingness to participate in research or tell researchers when they would like to drop out of a study. For these reasons, infants and young children require special accommodations as they participate in the research process.

24. Infant Visual Habituation by John Colombo and D. Wayne Mitchell Source: U.S. National Library of Medicine.

When thinking about special accommodations in developmental research, consider the **informed consent** process. If you have ever participated in psychological research, you may know through your own experience that adults commonly sign an informed consent statement (a contract stating that they agree to participate in research) after learning about a study. As part of this process, participants are informed of the procedures to be used in the research, along with any expected risks or benefits. Infants and young children cannot verbally indicate their willingness to participate, much less understand the balance of potential risks and benefits. As such, researchers are oftentimes required to obtain written informed consent from the parent or legal guardian of the child participant, an adult who is almost always present as the study is conducted. In fact, children are not asked to indicate whether they would like to be involved in a study at all (a process known as **assent**) until they are approximately seven years old. Because infants and young children also cannot easily indicate if they would like to discontinue their participation in a study, researchers must be sensitive to changes in the state of the participant (determining whether a child is too tired or upset to continue) as well as to parent desires (in some cases, parents might want to discontinue their involvement in the research). As in adult studies, researchers must always strive to protect the rights and well-being of the minor participants and their parents when conducting developmental science.[25]

Decisions about whether research is ethical are made using established ethical codes developed by scientific organizations, such as the American Psychological Association, and federal governments. In the United States, the Department of Health and Human Services provides the guidelines for ethical standards in

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research. The following are the American Psychological Association code of ethics when using humans in research (APA, 2016).

- No Harm: The most direct ethical concern of the scientist is to prevent harm to the research participants.
- Informed Consent: Researchers must obtain informed consent, which explains as much as possible about the true nature of the study, particularly everything that might be expected to influence willingness to participate. Participants can withdraw their consent to participate at any point.

Infants and young children cannot verbally indicate their willingness to participate, much less understand the balance of potential risks and benefits. As such, researchers are oftentimes required to obtain written **informed consent** from the parent or legal guardian of the child participant. Further, this adult is almost always present as the study is conducted. Children are not asked to indicate whether they would like to be involved in a study until they are approximately seven years old. Because infants and young children also cannot easily indicate if they would like to discontinue their participation in a study, researchers must be sensitive to changes in the state of the participant, such as determining whether a child is too tired or upset to continue, as well as to what the parent desires. In some cases, parents might want to discontinue their involvement in the research. As in adult studies, researchers must always strive to protect the rights and well-being of the minor participants and their parents when conducting developmental research.

- Confidentiality: Researchers must also protect the privacy of the research participants' responses by not using names or other information that could identify the participants.
- Deception: Deception occurs whenever research participants are not completely and fully informed about the nature of the research project before participating in it. Deception may

occur when the researcher tells the participants that a study is about one thing when in fact it is about something else, or when participants are not told about the hypothesis.

- Debriefing: At the end of a study debriefing, which is a procedure designed to fully explain the purposes and procedures of the research and remove any harmful aftereffects of participation, must occur.

3. Conception and Heredity

After Reading Chapter 3, you should be better equipped to:

- Evaluate the role of nature and nurture in development.
- Define genes and chromosomes.
- Differentiate between mitosis and meiosis.
- Explain dominant and recessive patterns on inheritance.
- List common genetic disorders and chromosomal abnormalities.
- Describe changes that occur within each of the three periods of prenatal development.
- Recognize the risks to prenatal development posed by exposure to teratogens.
- Evaluate different types of prenatal assessment.

Heredity

The Human Genome Project

The Human Genome Project is an internationally funded effort to map the locations of human genes and understand the role these genes play in development, health, and illness. (recent developments can be found at www.genome.gov). Genes are segments of chromosomes (46 strands of a chemical substance called DNA that are contained in the nucleus of each normal human cell) that vary in length. There are an estimated 25,000 to 30,000 genes on each chromosome; a number far below the estimate of 100,000-150,000 held before the work of the Human Genome Project.
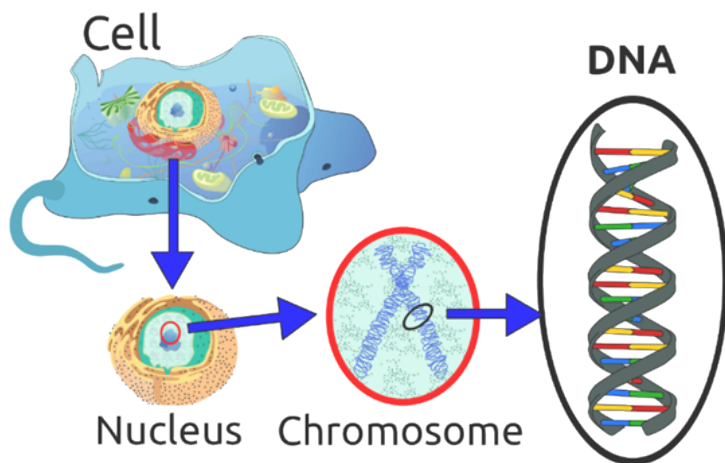
Image of DNA's location in a cell [2]

Understanding the role of genes in health and illness can bring about both harm and good (Weitz, 2007). A person who knows that

they are at risk for developing a genetic disorder may be able to adopt lifestyle practices that minimize the risk and a person who discovers that they are not at risk may find comfort in knowing that they do not have to fear a particular disease. However, a person who finds out that they are at risk and there is nothing that can be done about it may experience years of fear and anxiety. And the availability of genetic testing may be more widespread than the availability of genetic counseling which can be very expensive. The possible stigma and discrimination that those with illness or at risk for illness must also be considered. Considering the high costs of health insurance, many companies are starting to offer benefits contingent on health assessments and lifestyle recommendations; and continued coverage depends on an employee following these recommendations. So, a smoker may have to pay a higher premium than a non-smoker or a person who is overweight may be required to engage in a program of exercise and be monitored for improvement. What if a person finds out that they carry the gene for Huntington's disease (a neurological disorder that is ultimately fatal) which may surface when a person reaches their 40s? The impact this knowledge will have on health care continues to remain unknown. Who should know what is on your genome? Do you think this information should be shared between mates? What about employers? What would be the advantages and disadvantages?[1]

Genes and Chromosomes

Normal human cells contain 46 chromosomes (or 23 pairs; one from each parent) in the nucleus of the cells. After conception, most cells of the body are created by a process called **mitosis**. Mitosis

1. Lifespan Development by Lumen Learning is licensed under CC BY 4.0

is defined as the cell's nucleus making an exact copy of all the chromosomes and splitting into two new cells.

However, the cells used in sexual reproduction, called the gametes (sperm or ova), are formed in a process called **meiosis**. In meiosis, the gamete's chromosomes duplicate, and then divide twice resulting in four cells containing only half the genetic material of the original gamete. Thus, each sperm and egg possess only 23 chromosomes and combine to produce the normal 46. Given the number of genes present and the unpredictability of the meiosis process, the likelihood of having offspring that are genetically identical (and not twins) is one in trillions (Gould & Keeton, 1997).[2]
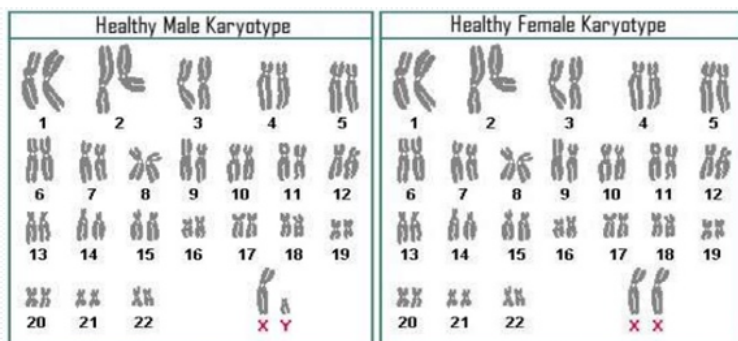
Summary of Mitosis and Meiosis[3]

Type of Cell Division	Explanation	Steps
Mitosis	All cells, except those used in sexual reproduction, are created by mitosis	Step 1. Chromosomes make a duplicate copy Step 2. Two identical cells are created
Meiosis	Cells used in sexual reproduction are created by meiosis	Step 1. Exchange of gene between the chromosomes (crossing over) Step 2. Chromosomes make a duplicate Step 3. First cell division Step 4. Second cell division

2. Lifespan Development: A Psychological Perspective by Martha Lally and Suzanne Valentine-French is licensed under CC BY-NC-SA 3.0
3. Children's Development by Ana R. Leon is licensed under CC BY 4.0

From Genotype to Phenotype

Each human body cell has a full complement of DNA stored in 23 pairs of chromosomes. The image below shows the pairs in a systematic arrangement called a karyotype. Among these is one pair of chromosomes, called the sex chromosomes, that determines the sex of the individual (XX in females, XY in males). The remaining 22 chromosome pairs are called autosomal chromosomes. Each of these chromosomes carries hundreds or even thousands of genes, each of which codes for the assembly of a particular protein—that is, genes are "expressed" as proteins. An individual's complete genetic makeup is referred to as his or her genotype. The characteristics that the genes express, whether they are physical, behavioral, or biochemical, are a person's phenotype.

You inherit one chromosome in each pair—a full complement of 23—from each parent. This occurs when the sperm and oocyte combine at the moment of your conception. Homologous chromosomes—those that make up a complementary pair—have genes for the same characteristics in the same location on the chromosome. Because one copy of a gene, an allele, is inherited from each parent, the alleles in these complementary pairs may vary. Take for example an allele that encodes for dimples. A child may inherit the allele encoding for dimples on the chromosome from the father and the allele that encodes for smooth skin (no dimples) on the chromosome from the mother. The following figure shows the 23 pairs of chromosomes in both a male and female human being.[4]

4. Anatomy &Physiology by OpenStax is licensed under CC BY 4.0

| Healthy Male Karyotype | Healthy Female Karyotype |

Each pair of chromosomes contains hundreds to thousands of genes. The banding patterns are nearly identical for the two chromosomes within each pair, indicating the same organization of genes. As is visible in this karyotype, the only exception to this is the XY sex chromosome pair in males. (credit: National Human Genome Research Institute). [5]

Although a person can have two identical alleles for a single gene (a homozygous state), it is also possible for a person to have two different alleles (a heterozygous state). The two alleles can interact in several different ways. The expression of an allele can be dominant, for which the activity of this gene will mask the expression of a nondominant, or recessive, allele. Sometimes dominance is complete; at other times, it is incomplete. In some

5. Anatomy &Physiology by OpenStax is licensed under CC BY 4.0

cases, both alleles are expressed at the same time in a form of expression known as codominance.

In the simplest scenario, a single pair of genes will determine a single heritable characteristic. However, it is quite common for multiple genes to interact to confer a feature. For instance, eight or more genes—each with their own alleles—determine eye color in humans. Moreover, although any one person can only have two alleles corresponding to a given gene, more than two alleles commonly exist in a population. This phenomenon is called multiple alleles. For example, there are three different alleles that encode ABO blood type.[6]

Mendel's Theory of Inheritance

Our contemporary understanding of genetics rests on the work of a nineteenth-century monk. Working in the mid-1800s, long before anyone knew about genes or chromosomes, Gregor Mendel discovered that garden peas transmit their physical characteristics to subsequent generations in a discrete and predictable fashion. When he mated, or crossed, two pure-breeding pea plants that differed by a certain characteristic, the first-generation offspring all looked like one of the parents. For instance, when he crossed tall and dwarf pure-breeding pea plants, all of the offspring were tall. Mendel called tallness dominant because it was expressed in offspring when it was present in a purebred parent. He called dwarfism recessive because it was masked in the offspring if one of the purebred parents possessed the dominant characteristic. Note that tallness and dwarfism are variations on the characteristic of height. Mendel called such a variation a trait. We now know that

6. Anatomy &Physiology by OpenStax is licensed under CC BY 4.0

these traits are the expression of different alleles of the gene encoding height.

Mendel performed thousands of crosses in pea plants with differing traits for a variety of characteristics. And he repeatedly came up with the same results—among the traits he studied, one was always dominant, and the other was always recessive. (Remember, however, that this dominant–recessive relationship between alleles is not always the case; some alleles are codominant, and sometimes dominance is incomplete.)

In the language of genetics, Mendel's theory applied to humans says that if an individual receives two dominant alleles, one from each parent, the individual's phenotype will express the dominant trait. If an individual receives two recessive alleles, then the recessive trait will be expressed in the phenotype. Individuals who have two identical alleles for a given gene, whether dominant or recessive, are said to be homozygous for that gene (homo- = "same"). Conversely, an individual who has one dominant allele and one recessive allele is said to be heterozygous for that gene (hetero- = "different" or "other"). In this case, the dominant trait will be expressed, and the individual will be phenotypically identical to an individual who possesses two dominant alleles for the trait.

It is common practice in genetics to use capital and lowercase letters to represent dominant and recessive alleles. Using Mendel's pea plants as an example, if a tall pea plant is homozygous, it will possess two tall alleles (TT). A dwarf pea plant must be homozygous because its dwarfism can only be expressed when two recessive alleles are present (tt). A heterozygous pea plant (Tt) would be tall and phenotypically indistinguishable from a tall homozygous pea plant because of the dominant tall allele.

Because of the random segregation of gametes, the laws of chance and probability come into play when predicting the likelihood of a given phenotype. Consider a cross between an individual with two dominant alleles for a trait (AA) and an individual with two recessive alleles for the same trait (aa). All of the parental gametes from the dominant individual would be A, and all of the parental gametes

from the recessive individual would be a. All of the offspring of that second generation, inheriting one allele from each parent, would have the genotype Aa, and the probability of expressing the phenotype of the dominant allele would be 4 out of 4, or 100 percent as is illustrated in the Punnett Square (a Punnett square is a diagram used to predict possible genotypes) below.[7]

Generation 1 Cross: AA   ×   aa

	a	a
A	Aa	Aa
A	Aa	Aa
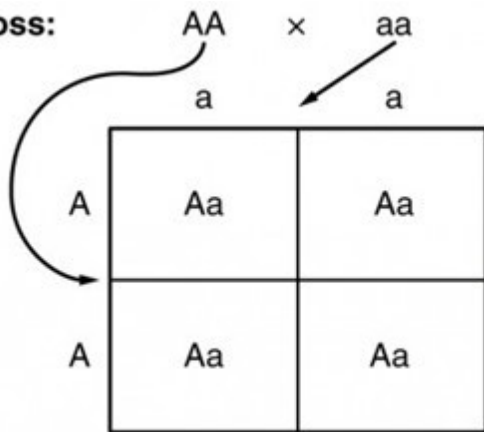
Possible outcomes of cross between one individual with homozygous, dominant alleles and one individual with homozygous recessive alleles[8]

7. Anatomy &Physiology by OpenStax is licensed under CC BY 4.0 (modified by Maria Pagano)
8. Anatomy &Physiology by OpenStax is licensed under CC BY 4.0

Mendelian genetics represent the fundamentals of inheritance, but there are two important qualifiers to consider when applying Mendel's findings to inheritance studies in humans. First, as we've already noted, not all genes are inherited in a dominant–recessive pattern. Although all **diploid** individuals have two alleles for every gene, allele pairs may interact to create several types of inheritance patterns, including incomplete dominance and codominance.

Secondly, Mendel performed his studies using thousands of pea plants and this large sample size overcame the influence of variability resulting from chance. In contrast, no human couple has ever had thousands of children. If we know that a man and woman are both heterozygous for a recessive genetic disorder, we would predict that one in every four of their children would be affected by the disease. In real life, however, the influence of chance could change that ratio significantly. For example, if a man and a woman are both heterozygous for cystic fibrosis, a recessive genetic disorder that is expressed only when the individual has two defective alleles, we would expect one in four of their children to have cystic fibrosis. However, it is entirely possible for them to have seven children, none of whom is affected, or for them to have two children, both of whom are affected. For each individual child, the presence or absence of a single gene disorder depends on which alleles that child inherits from his or her parents.[9]
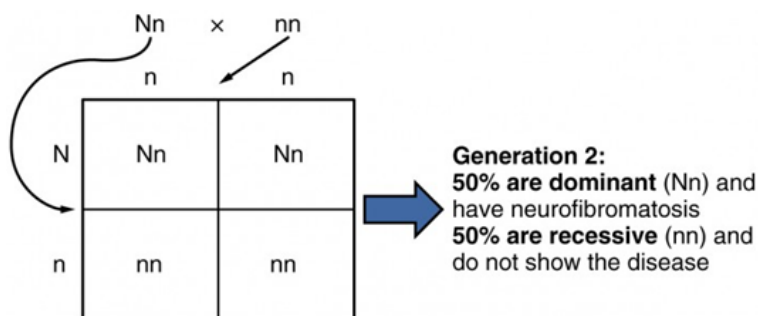
Autosomal Dominant Inheritance

In the case of cystic fibrosis, the disorder is recessive to the normal phenotype. However, a genetic abnormality may be dominant to

(modified by Maria Pagano)
9. Anatomy &Physiology by OpenStax is licensed under CC BY 4.0 (modified by Maria Pagano)

the normal phenotype. When the dominant allele is located on one of the 22 pairs of autosomes (non-sex chromosomes), we refer to its inheritance pattern as **autosomal dominant**. An example of an autosomal dominant disorder is neurofibromatosis type I, a disease that induces tumor formation within the nervous system that leads to skin and skeletal deformities. Consider a couple in which one parent is heterozygous for this disorder (and who therefore has neurofibromatosis), Nn, and one parent is homozygous for the normal gene, nn. The heterozygous parent would have a 50 percent chance of passing the dominant allele for this disorder to his or her offspring, and the homozygous parent would always pass the normal allele. Therefore, four possible offspring genotypes are equally likely to occur: Nn, Nn, nn, and nn. That is, every child of this couple would have a 50 percent chance of inheriting neurofibromatosis.[10]

Nn   ×   nn

	n	n	Generation 2:
N	Nn	Nn	**50% are dominant** (Nn) and have neurofibromatosis
n	nn	nn	**50% are recessive** (nn) and do not show the disease

Punnett Square demonstrating the possible outcomes between one individual who is heterozygous for neurofibromatosis (Nn) and one who is homozygous and does not carry the dominant trait disorder of neurofibromatosis (nn). [15]

Other genetic diseases that are inherited in this pattern are achondroplastic dwarfism, Marfan syndrome, and Huntington's disease. Because autosomal dominant disorders are expressed by the presence of just one gene, an individual with the disorder will know that he or she has at least one faulty gene. The expression of the disease may manifest later in life, after the childbearing years, which is the case in Huntington's disease.[11]

Autosomal Dominant Disorders (Heterozygous): To have the disorder, the individual only needs to inherit the gene change from one parent.[12]
Examples of Autosomal Dominant Disorders (Heterozygous) [13]

11. Anatomy &Physiology by OpenStax is licensed under CC BY 4.0
12. Children's Development by Ana R. Leon is licensed under CC BY 4.0
13. Lifespan Development: A Psychological Perspective by Martha Lally and Suzanne Valentine-French is licensed under CC BY-NC-SA 3.0

| Disorder	Description	Cases per Birth
Huntington's Disease	A condition that affects the individual's nervous system. Nerve cells become damaged, causing various parts of the brain to deteriorate. The disease affects movement, behavior and cognition. It is fatal, and occurs at midlife.	1 in 10,000
Tourette Syndrome	A tic disorder which results in uncontrollable motor and vocal tics as well as body jerking	1 in 250
Achondroplasia	The most common form of disproportionate short stature. The individual has abnormal bone growth resulting in short stature, disproportionately short arms and legs, short fingers, a large head, and specific facial features.	1 in 15,000–40,000

Autosomal Recessive Inheritance

When a genetic disorder is inherited in an **autosomal recessive pattern**, the disorder corresponds to the recessive phenotype. Heterozygous individuals will not display symptoms of this disorder, because their unaffected gene will compensate. Such an individual is called a **carrier**. Carriers for an autosomal recessive disorder may never know their genotype unless they have a child with the disorder.

An example of an autosomal recessive disorder is cystic fibrosis (CF), which we introduced earlier. CF is characterized by the chronic accumulation of a thick, tenacious mucus in the lungs and digestive tract. Decades ago, children with CF rarely lived to adulthood. With advances in medical technology, the average lifespan in developed countries has increased into middle adulthood. CF is a relatively common disorder that occurs in approximately 1 in 2000 Caucasians. A child born to two CF carriers would have a 25 percent chance of inheriting the disease. The pattern is shown in the image

below, using a diagram that tracks the likely incidence of an autosomal recessive disorder on the basis of parental genotypes.[14]

On the other hand, a child born to a CF carrier and someone with two unaffected alleles would have a 0 percent probability of inheriting CF but would have a 50 percent chance of being a carrier. Other examples of autosome recessive genetic illnesses include the blood disorder sickle-cell anemia, the fatal neurological disorder Tay–Sachs disease, and the metabolic disorder phenylketonuria.[15]
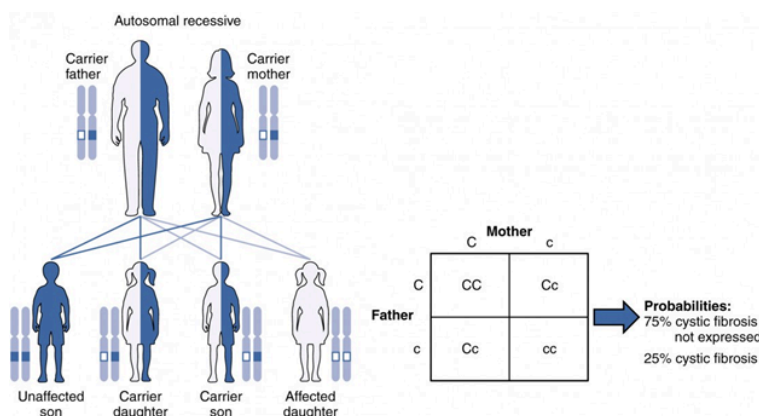
The inheritance pattern of an autosomal recessive disorder with two carrier parents reflects a 3:1 probability of expression among offspring. (credit: U.S. National Library of Medicine)[16][/caption]

Recessive Disorders (*Homozygous*): The individual inherits a gene change from both parents. If the gene is inherited from just

14. Anatomy &Physiology by OpenStax is licensed under CC BY 4.0 (modified by Maria Pagano)
15. Anatomy &Physiology by OpenStax is licensed under CC BY 4.0
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**one parent, the person is a carrier and does not have the
condition. Recessive gene disorders, such as cystic fibrosis and
sickel-cell anemia, are less common but may claim more lives
because they are less likely to be detected.**[17]
Examples of Recessive Trait Disorders (Homozygous)[18]

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Disorder	Description	Cases per Birth
Sickle Cell Disease (SCD)	A condition in which the red blood cells in the body are shaped like a sickle (like the letter C) and affect the ability of the blood to transport oxygen.	1 in 500 Black births 1 in 36,000 Hispanic births
Cystic Fibrosis (CF)	A condition that affects breathing and digestion due to thick mucus building up in the body, especially the lungs and digestive system. In CF, the mucus is thicker than normal and sticky.	1 in 3500
Phenylketonuria (PKU)	A metabolic disorder in which the individual cannot metabolize phenylalanine, an amino acid. Left untreated, intellectual deficits occur. PKU is easily detected and is treated with a special diet.	1 in 10,000
		1 in 4000
Tay Sachs Disease	Caused by an enzyme deficiency resulting in the accumulation of lipids in the nerves cells of the brain. This accumulation results in progressive damage to the cells and a decrease in cognitive and physical development. Death typically occurs by age five.	1 in 30 American Jews is a carrier 1 in 20 French Canadians is a carrier
Albinism	When the individual lacks melanin and processes little to no pigment in the skin, hair, and eyes. Vision problems can also occur.	Fewer than 20,000 US cases per year

Sex-Linked Disorders

When the X chromosome carries the mutated gene, the disorder is referred to as an **X-linked disorder**. Males are more affected than

females because they possess only one X chromosome without an additional X chromosome to counter the harmful gene.[19]

X-linked Dominant or Recessive Inheritance

An X-linked transmission pattern involves genes located on the X chromosome of the 23rd pair. Recall that a male has one X and one Y chromosome. When a father transmits a Y chromosome, the child is male, and when he transmits an X chromosome, the child is female. A mother can transmit only an X chromosome, as both her sex chromosomes are X chromosomes.

X-linked Dominant Inheritance

When an abnormal allele for a gene that occurs on the X chromosome is dominant over the normal allele, the pattern is described as **X-linked dominant**. This is the case with vitamin D–resistant rickets: an affected father would pass the disease gene to all of his daughters, but none of his sons, because he donates only the Y chromosome to his sons. If it is the mother who is affected, all of her children—male or female—would have a 50 percent chance of inheriting the disorder because she can only pass an X chromosome on to her children. For an affected female, the inheritance pattern would be identical to that of an autosomal dominant inheritance pattern in which one parent is heterozygous and the other is homozygous for the normal gene.[20]

19. Children's Development by Ana R. Leon is licensed under CC BY 4.0
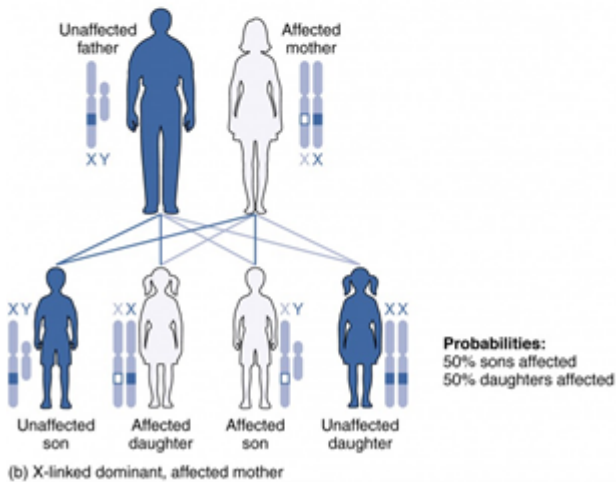20. Anatomy &Physiology by OpenStax is licensed under CC BY 4.0

Affected
father

Unaffected
mother

XY

XX

XY Unaffected son
XX Affected daughter
XY Unaffected son
XX Affected daughter

Probabilities:
0% sons affected
100% daughters affected

(a) X-linked dominant, affected father

Unaffected
father

Affected
mother

XY

XX

XY Unaffected son
XX Affected daughter
XY Affected son
XX Unaffected daughter

Probabilities:
50% sons affected
50% daughters affected
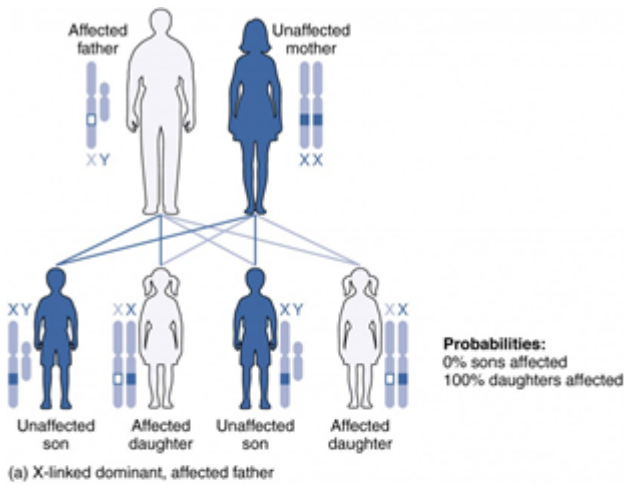
(b) X-linked dominant, affected mother

Chart depicting X-linked dominant inheritance patterns and how they might differ depending on whether (a) the father or (b) the mother is affected with the disease. (Credit: U.S. National Library of Medicine) …

Genetic Counseling: A service that assists individuals identify, test for, and explain potential genetic conditions that could adversely affect themselves or their offspring is referred to as genetic

counseling (CDC, 2015b). The common reasons for genetic counseling include:

- Family history of a genetic condition
- Membership in a certain ethnic group with a higher risk of a genetic condition
- Information regarding the results of genetic testing, including blood tests, amniocentesis, or ultra-sound
- Learning about the chances of having a baby with a genetic condition if the parents are older, have had several miscarriages, have offspring with birth defects, experience infertility, or have a medical condition[21]

Behavioral Genetics

Behavioral Genetics is the scientific study of the interplay between the genetic and environmental contributions to behavior. Often referred to as the nature/nurture debate, Gottlieb (1998, 2000, 2002) suggests an analytic framework for this debate that recognizes the interplay between the environment, behavior, and genetic expression. This bidirectional interplay suggests that the environment can affect the expression of genes just as genetic predispositions can impact a person's potentials. Additionally, environmental circumstances can trigger symptoms of a genetic disorder. For example, a person who has sickle cell anemia, a recessive gene linked disorder, can experience a sickle cell crisis under conditions of oxygen deprivation. Someone predisposed

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genetically for type-two diabetes can trigger the disease through poor diet and little exercise.

Research has shown how the environment and genotype interact in several ways. **Genotype-Environment Correlations** refer to the processes by which genetic factors contribute to variations in the environment (Plomin, DeFries, Knopik, & Niederhiser, 2013). There are three types of genotype-environment correlations:

> **Passive genotype-environment correlation** occurs when children passively inherit the genes and the environments their family provides. Certain behavioral characteristics, such as being athletically inclined, may run in families. The children have inherited both the genes that would enable success at these activities and given the environmental encouragement to engage in these actions.

> **Evocative genotype-environment correlation** refers to how the social environment reacts to individuals based on their inherited characteristics. For example, whether one has a more outgoing or shy temperament will affect how he or she is treated by others.

> **Active genotype-environment correlation** occurs when individuals seek out environments that support their genetic tendencies. This is also referred to as niche picking. For example, children who are musically inclined seek out music instruction and opportunities that facilitate their natural musical ability.

Genotype-Environment Interactions involve genetic susceptibility to the environment. Adoption studies provide evidence for genotype-environment interactions. For example, the Early Growth and Development Study (Leve, Neiderhiser, Scaramella, & Reiss, 2010) followed 360 adopted children and their adopted and biological parents in a longitudinal study. Results have shown that children whose biological parents exhibited psychopathology, exhibited significantly fewer behavior problems when their adoptive parents used more structured parenting than unstructured. Additionally, elevated psychopathology in adoptive

parents increased the risk for the children's development of behavior problems, but only when the biological parents' psychopathology was high. Consequently, the results show how environmental effects on behavior differ based on the genotype, especially stressful environments on genetically at-risk children.

Lastly, **epigenetics** studies modifications in DNA that affect gene expression and are passed on when the cells divide. Environmental factors, such as nutrition, stress, and teratogens are thought to change gene expression by switching genes on and off. These gene changes can then be inherited by daughter cells. This would explain why monozygotic or identical twins may increasingly differ in gene expression with age. For example, Fraga et al. (2005) found that when examining differences in DNA, a group of monozygotic twins were indistinguishable during the early years. However, when the twins were older there were significant discrepancies in their gene expression, most likely due to different experiences. These differences included susceptibilities to disease and a range of personal characteristics.[22]

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4. Prenatal Development

Learning Objectives

After reading Chapter 4 , you should be better equipped to:

- Describe changes that occur within each of the three periods of prenatal development
- Recognize the risks to prenatal development posed by exposure to teratogens.
- Evaluate different types of prenatal assessment.
- Describe complications associated with pregnancy
- Evaluate infertility options

Prenatal Development

Now we turn our attention to prenatal development which is divided into three periods: The **germinal period**, the **embryonic period**, and the **fetal period**. The following is an overview of some of the changes that take place during each period.

The Germinal Period

The germinal period (about 14 days in length) lasts from conception to implantation of the fertilized egg in the lining of the

uterus. At ejaculation millions of sperm are released into the vagina, but only a few reach the egg and typically only one fertilizes the egg. Once a single sperm has entered the wall of the egg, the wall becomes hard and prevents other sperm from entering. After the sperm has entered the egg, the tail of the sperm breaks off and the head of the sperm, containing the genetic information from the father, unites with the nucleus of the egg. It is typically fertilized in the top section of the fallopian tube and continues its journey to the uterus. As a result, a new cell is formed. This cell, containing the combined genetic information from both parents, is referred to as a zygote.[1]

1. Lifespan Development: A Psychological Perspective by Martha Lally and Suzanne Valentine-French is licensed under CC BY-NC-SA 3.0

During this time, the organism begins cell division through **mitosis**. After five days of mitosis there are 100 cells, which is now called a **blastocyst**. The blastocyst consists of both an inner and outer group of cells. The inner group of cells, or **inner cell mass** will become the embryo, while the outer group of cells, or **trophoblast**, becomes the support system which nourishes the developing organism. This stage ends when the blastocyst fully implants into the uterine wall (U.S. National Library of Medicine, 2015).[3]

2. Image is in the public domain
3. Lifespan Development: A Psychological Perspective by Martha Lally and Suzanne Valentine-French is licensed under CC BY-NC-SA 3.0

Trophoblast

endometrium

inner cell mass
(embryoblast)

trophoblast

blastocyst cavity
(blastocoele)

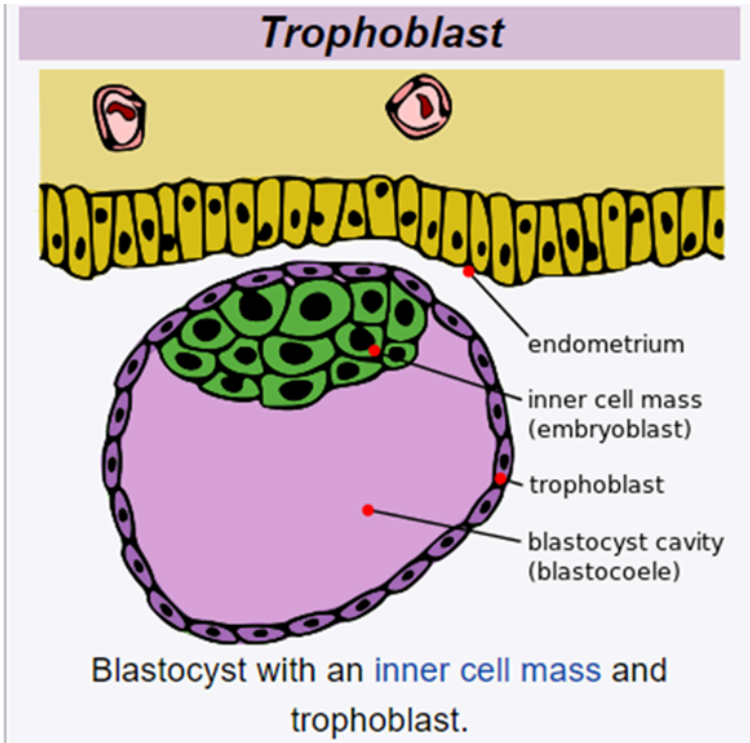Blastocyst with an inner cell mass and trophoblast.

Image of the blastocyst at 6 days which shows the inner cell mass, which will become the fetus, the trophoblast which will form the placenta, and the blastocoel, a fluid-filled cavity. The endometrium is the lining of the uterus where the embryo will implant. [4]

4. Image from Wikipedia and is licensed under CC BY-NC-SA 3.0

Mitosis is a fragile process and fewer than one half of all zygotes survive beyond the first two weeks (Hall, 2004). Some of the reasons for this include the egg and sperm do not join properly, thus their genetic material does not combine, there is too little or damaged genetic material, the zygote does not replicate, or the blastocyst does not implant into the uterine wall. The failure rate is higher for **in vitro conceptions**. The figure below illustrates the journey of the ova from its release to its fertilization, cell duplication, and implantation into the uterine lining.[5]
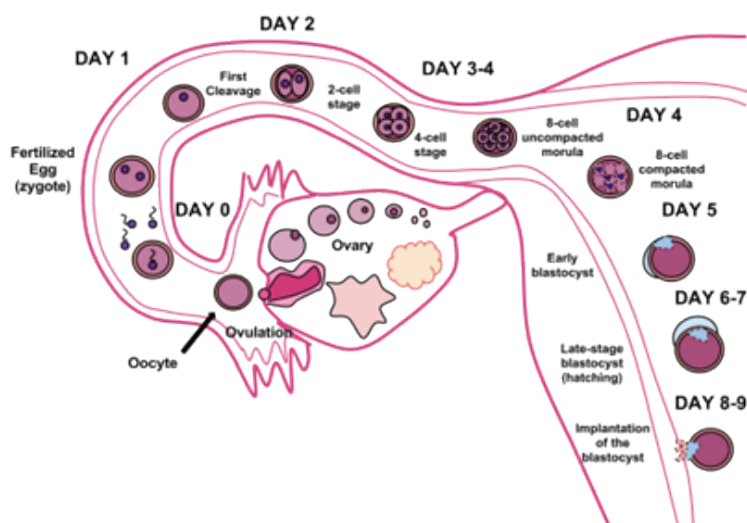
5. Lifespan Development: A Psychological Perspective by Martha Lally and Suzanne Valentine-French is licensed under CC BY-NC-SA 3.0

Human Fertilization. The sperm and ovum unite through fertilization creating a zygote that (over the course of 8-9 days) will implant in the uterine wall, where it will reside over the course of 9 months.[6]

The Embryonic Period

Starting the third week, the blastocyst has implanted in the uterine wall. Upon implantation this multi-cellular organism is called an **embryo**. Now blood vessels grow forming the **placenta**. The placenta is a structure connected to the uterus that provides nourishment and oxygen from the mother to the developing embryo via the umbilical cord.

During this period, cells continue to differentiate. Growth during prenatal development occurs in two major directions: from head to tail called **cephalocaudal development** and from the midline outward referred to as **proximodistal development**. This means that those structures nearest the head develop before those nearest the feet and those structures nearest the torso develop before those away from the center of the body (such as hands and fingers). You will see that this pattern continues after birth.

The head develops in the fourth week and the precursor to the heart begins to pulse. In the early stages of the embryonic period, gills and a tail are apparent. However, by the end of this stage they disappear and the organism takes on a more human appearance.

6. Image by Ttrue12 is licensed under CC BY-SA 3.0

Human embryo – Approximately 8 weeks estimated gestational age[7]

About 20 percent of organisms fail during the embryonic period, usually due to gross chromosomal abnormalities, often before the mother even knows that she is pregnant. It is during this stage that the major structures of the body are taking form, making the embryonic period the time when the organism is most vulnerable to the greatest amount of damage if exposed to harmful substances. Prospective mothers are not often aware of the risks they introduce to the developing embryo during this time. The embryo is approximately 1 inch in length and weighs about 4 grams at the end

7. Image by lunar caustic is licensed under CC BY 2.0

of eight weeks. The embryo can move and respond to touch at this time.

The Fetal Period

From the ninth week until birth (which is forty weeks for a full-term pregnancy), the organism is referred to as a **fetus**. During this stage, the major structures are continuing to develop. By the third month, the fetus has all its body parts including external genitalia. The fetus is about 3 inches long and weighs about 28 grams. In the following weeks, the fetus will develop hair, nails, teeth and the excretory and digestive systems will continue to develop. [8]

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Fetus sucking thumb[9]

During the 4th – 6th months, the eyes become more sensitive to light and hearing develops. The respiratory system continues to develop, and reflexes such as sucking, swallowing, and hiccupping, develop during the 5th month. Cycles of sleep and wakefulness are also present as well. The first chance of survival outside the womb, known as the age of viability, is reached at about 24 weeks (Morgan, Goldenberg, & Schulkin, 2008). Many practitioners hesitate to resuscitate before 24 weeks. Most of the neurons in the brain have developed by 24 weeks, although they are still rudimentary, and the **glial** or **nurse cells** that support neurons continue to grow. At 24 weeks the fetus can feel pain (Royal College of Obstetricians and Gynecologists, 1997).

Between the 7th – 9th months, the fetus is primarily preparing for birth. It is exercising its muscles and its lungs begin to expand and contract. The fetus gains about 5 pounds and 7 inches during this last trimester of pregnancy, and during the 8th month a layer of fat develops under the skin. This layer of fat serves as insulation and helps the baby regulate body temperature after birth.

At around 36 weeks the fetus is almost ready for birth. It weighs about 6 pounds and is about 18.5 inches long. By week 37 all of the fetus's organ systems are developed enough that it could survive outside the mother's uterus without many of the risks associated with premature birth. The fetus continues to gain weight and grow in length until approximately 40 weeks. By then the fetus has very little room to move around and birth becomes imminent. The

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progression through the fetal and embryonic stages can be found in the following figure.[10]

Prenatal development of a fetus[11]

9 weeks
Fetal stage begins

12 weeks
Sex organs differentiate

16 weeks
Fingers and toes develop

20 weeks
Hearing begins

24 weeks
Lungs begin to develop

28 weeks
Brain grows rapidly

32 weeks
Bones fully develop

36 weeks
Muscles fully develop

40 weeks
Full-term development

10. Lifespan Development: A Psychological Perspective (pages 44-45) by Martha Lally and Suzanne Valentine-French is licensed under CC BY-NC-SA 3.0

11. Image by CNX Psychology is licensed under CC BY 4.0

Monozygotic and Dizygotic Twins

Monozygotic or identical twins occur when a fertilized egg splits apart in the first two weeks of development. The result is the creation of two separate, but genetically identical offspring. That is, they possess the same genotype and often the same phenotype. About one-third of twins are monozygotic twins.

Sometimes, however, two eggs or ova are released and fertilized by two separate sperm. The result is **dizygotic** or fraternal twins. These two individuals share the same amount of genetic material as would any two children from the same mother and father. In other words, they possess a different genotype and phenotype.

Older mothers are more likely to have dizygotic twins than are younger mothers, and couples who use fertility drugs are also more likely to give birth to dizygotic twins.[12]

Monozygotic Twins[13]

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12. Lifespan Development: A Psychological Perspective by Martha Lally and Suzanne Valentine-French is licensed under CC BY-NC-SA 3.0
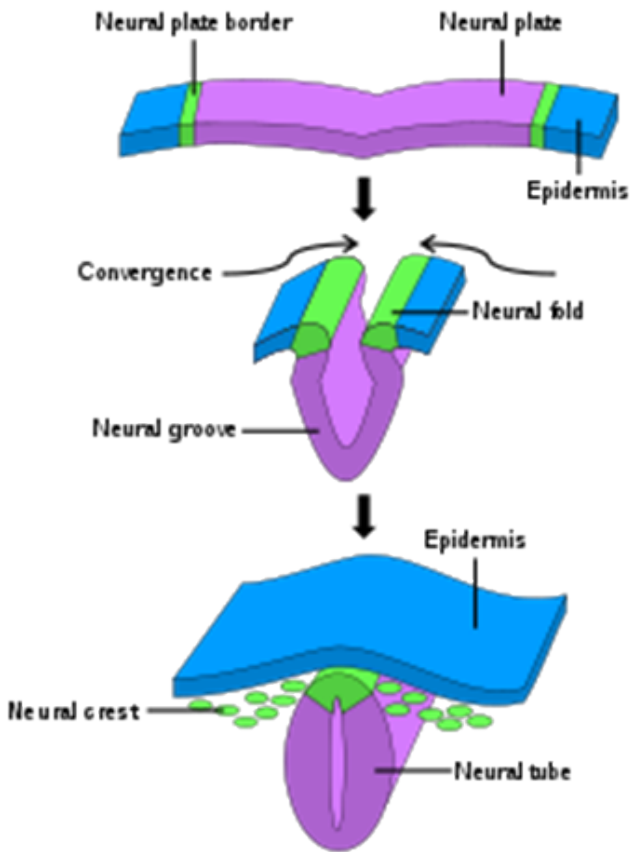13. Image is in the public domain

Dizygotic Twins[14]

Prenatal Brain Development

Prenatal brain development begins in the third gestational week with the differentiation of **stem cells**, which can produce all the different cells that make up the brain (Stiles & Jernigan, 2010). The location of these stem cells in the embryo is referred to as the neural plate. [15] The formation and folding of the neural plate is the first step in **primary neurulation**, which is then followed by the refinement and growth of neural plate cells. The third step of primary neurulation does not involve the neural plate per se, but rather the edges of the neural plate, which come together, turning the plate into the start of the **neural tube**. With the neural plate having folded into a tube, the neural folds come together to complete the fusion of the neural tube. This process is illustrated in the figure below, where the neural plate is shown in purple. The lime green marks the edges of the neural plate, which become the neural folds, involved in the folding of the plate to create the neural tube. The figure below demonstrates the development of the neural plate into the neural tube, which is where the neural crest cells are derived from as well.[16]

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16. Text and image from Wikipedia and is licensed under CC BY-NC-SA 3.0

Neural plate border   Neural plate

Epidermis

Convergence

Neural fold

Neural groove

Epidermis

Neural crest

Neural tube

By the end of the third week, two ridges appear along the neural plate first forming the neural groove and then the neural tube. The open region in the center of the

> neural tube forms the brain's ventricles and spinal canal. By the end of the embryonic period, or week eight, the neural tube has further differentiated into the forebrain, midbrain, and hindbrain. [17]

Brain development during the fetal period involves neuron production, migration, and differentiation. From the early fetal period until midgestation, most of the 85 billion **neurons** have been generated and many have already migrated to their brain positions. **Neurogenesis**, or the formation of neurons, is largely completed after five months of gestation. One exception is in the **hippocampus**, which continues to develop neurons throughout life. Neurons that form the neocortex, or the layer of cells that lie on the surface of the brain, migrate to their location in an orderly way. Neural migration is mostly completed in the cerebral cortex by 24 weeks (Poduri & Volpe, 2018). Once in position, neurons begin to produce **dendrites** and **axons** that begin to form the **neural networks** responsible for information processing. Regions of the brain that contain the cell bodies are referred to as the **gray matter** because they look gray in appearance. The axons that form the neural pathways make up the **white matter** because they are covered in **myelin**, a fatty substance that is white in appearance. Myelin aids in both the insulation and efficiency of neural transmission. Although cell differentiation is complete at birth, the growth of dendrites, axons, and synapses continue for years. [18]

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18. Lifespan Development: A Psychological Perspective by Martha

Teratogens

Good prenatal care is essential to protect against maternal and fetal/infant mortality and birth complications. The embryo and fetus are most at risk for some of the most severe problems during the first three months of development. Unfortunately, this is a time at which many mothers are unaware that they are pregnant. Today, we know many of the factors that can jeopardize the health of the developing child. The study of factors that contribute to birth defects is called teratology, and the environmental factors that can contribute to birth defects are called **teratogens**. Teratogens include some maternal diseases, pollutants, drugs, and alcohol.

There are several considerations in determining the type and amount of damage that might result from exposure to a particular teratogen (Berger, 2005). These include:

- The timing of the exposure: Structures in the body are vulnerable to the most severe damage when they are forming. If a substance is introduced during a particular structure's critical period (time of development), the damage to that structure may be greater. For example, the ears and arms reach their critical periods at about 6 weeks after conception. If a mother exposes the embryo to certain substances during this period, the arms and ears may be malformed. (see figure below)
- The amount of exposure: Some substances are not harmful unless the amounts reach a certain level. The critical level depends in part on the size and metabolism of the mother.
- The number of teratogens: Fetuses exposed to multiple teratogens typically have more problems than those exposed

to only one.

- Genetics: Genetic makeup also plays a role on the impact a particular teratogen might have on the child. This is suggested by fraternal twins exposed to the same prenatal environment, but they do not experience the same teratogenic effects. The genetic makeup of the mother can also have an effect; some mothers may be more resistant to teratogenic effects than others.
- Being male or female: Males are more likely to experience damage due to teratogens than are females. It is believed that the Y chromosome, which contains fewer genes than the X, may have an impact.[19]

Critical periods of Prenatal Development[20]
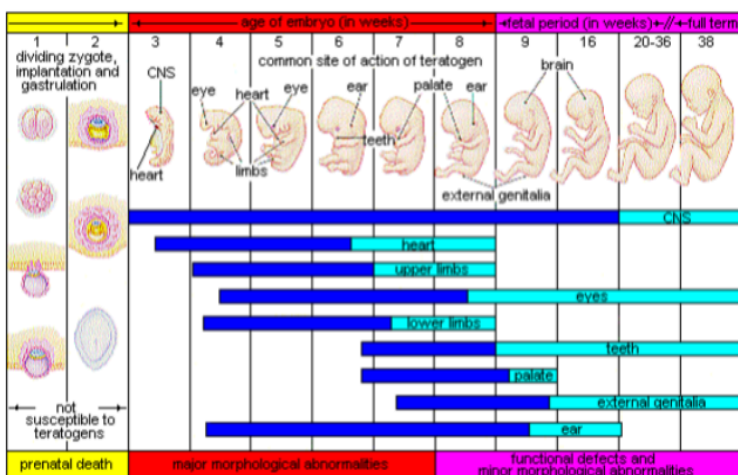
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20. Image by Laura Overstreet is licensed under CC BY-NC-SA 3.0

There are four categories of teratogens:

1. Physical teratogens: These could be saunas, hot tubs, or infections that raise a pregnant woman's body temperature to 102 degrees Fahrenheit or higher. This is associated with neural tube defects, spontaneous abortions, and various cardiovascular abnormalities.
2. **Metabolic** conditions affecting pregnant females: Metabolic conditions are abnormalities in the chemical process of producing energy from food, and thereby affect the development and function of the body. If a pregnant woman is malnourished, then her fetus likely lacks the nutrients essential for its development. These include malnutrition, diabetes, and thyroid disorders.
3. Infections: Different maternal infections, including rubella virus, herpes simplex virus, and syphilis can cause congenital abnormalities in fetuses.
4. Drugs and chemicals: When pregnant females ingest or absorb these, they may cause a variety of different effects based on specific agent, amount of exposure, and timing. This category includes radiation, heavy metals (including lead), insecticides and herbicides, prescription and over the counter drugs, illicit and recreational drugs, alcohol, cigarettes, nicotine, caffeine, and even some vitamins.[21]
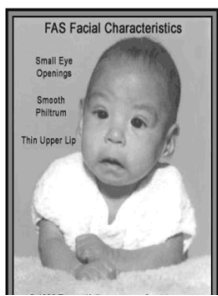
Alcohol: One of the most common teratogens is alcohol, and because half of all pregnancies in the United States are unplanned, it is recommended that women of child-bearing age take great caution against drinking alcohol when not using birth control or when pregnant (CDC, 2005). Alcohol use during pregnancy is the

21. The Embryo Project Encyclopedia by Chanapa Tantibanchachai is licensed under CC BY-NC-SA 3.0

leading preventable cause of intellectual disabilities in children in the United States (Maier & West, 2001). Alcohol consumption at any point during pregnancy, but particularly during the second month of prenatal development, may lead to neurocognitive and behavioral difficulties that can last a lifetime.

In extreme cases, alcohol consumption during pregnancy can lead to fetal death, but also can result in Fetal Alcohol Spectrum Disorders (FASD), which is an umbrella term for the range of effects that can occur due to alcohol consumption during pregnancy (March of Dimes, 2016a). The most severe form of FASD is Fetal Alcohol Syndrome (FAS). Children with FAS share certain physical features such as flattened noses, small eye holes, and small heads.

Fetal Alcohol Spectrum Disorders[22]

Fetal Alcohol Spectrum Disorder Facial Features	
Facial Feature	**Potential Effect of Fetal Alcohol**
Head size	Below-average head circumference
Eyes skin	Smaller than average eye opening,
Nose	Low nasal bridge, short nose
Midface	Smaller than average midface size
Lip and philtrum	Thin upper lip, indistinct philtrum

Cognitively, these children have poor judgment, poor impulse control, higher rates of ADHD, learning issues, and lower IQ scores. These developmental problems and delays persist into adulthood (Streissguth, Barr, Kogan, & Bookstein, 1996) and can include criminal behavior, psychiatric problems, and unemployment (CDC, 2016a). Based on animal studies, it has been hypothesized that a

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mother's alcohol consumption during pregnancy may predispose her child to like alcohol (Youngentob, Molina, Spear, & Youngentob, 2007). Binge drinking, or 4 or more drinks in 2 to 3 hours, during pregnancy increases the chance of having a baby with FASD (March of Dimes, 2016a).[23]

Drugs as Teratogens

Tobacco: According to the Centers for Disease Control and Prevention (Drake, Driscoll, and Mathews 2016) approximately 7.2% of women who gave birth smoked cigarettes during pregnancy.[24] When a pregnant woman smokes the fetus is exposed to dangerous chemicals including nicotine, carbon monoxide and tar, which lessen the amount of oxygen available to the fetus. Oxygen is important for overall growth and development. Tobacco use during pregnancy has been associated with low birth weight, **ectopic pregnancy** (fertilized egg implants itself outside of the uterus), **placenta previa** (placenta lies low in the uterus and covers all or part of the cervix), placenta abruption (placenta separates prematurely from the uterine wall), preterm delivery, stillbirth, fetal growth restriction, sudden infant death syndrome (SIDS), birth defects, learning disabilities, and early puberty in girls (Center for Disease Control, 2015d).

A woman being exposed to secondhand smoke during pregnancy has also been linked to low-birth weight infants. In addition, exposure to thirdhand smoke, or toxins from tobacco smoke that

23. Lifespan Development: A Psychological Perspective by Martha Lally and Suzanne Valentine-French is licensed under CC BY-NC-SA 3.0
24. Cigarette Smoking During Pregnancy: United States, 2016 by Drake, Driscoll, and Mathews. Centers for Disease Control and Prevention.

linger on clothing, furniture, and in locations where smoking has occurred, results in a negative impact on infants' lung development. Rehan, Sakurai, and Torday (2011) found that prenatal exposure to thirdhand smoke played a greater role in altered lung functioning in children than exposure postnatally.

Prescription/Over-the-counter Drugs: About 70% of pregnant women take at least one prescription drug (March of Dimes, 2016e). A woman should not be taking any prescription drug during pregnancy unless it was prescribed by a health care provider who knows she is pregnant. Some prescription drugs can cause birth defects, problems in overall health, and development of the fetus. Over-the-counter drugs are also a concern during the prenatal period because they may cause certain health problems. For example, the pain reliever ibuprofen can cause serious blood flow problems to the fetus during the last three months.

Illicit Drugs: Common illicit drugs include cocaine, ecstasy and other club drugs, heroin, marijuana, and prescription drugs that are abused. It is difficult to completely determine the effects of a particular illicit drug on a developing child because most mothers who use, use more than one substance and have other unhealthy behaviors. These include smoking, drinking alcohol, not eating healthy meals, and being more likely to get a sexually transmitted disease. However, several problems seem clear. The use of cocaine is connected with low birth weight, stillbirths and spontaneous abortion. Heavy marijuana use is associated with problems in brain development (March of Dimes, 2016c). If a baby's mother used an addictive drug during pregnancy that baby can get addicted to the drug before birth and go through drug withdrawal after birth, also known as Neonatal abstinence syndrome (March of Dimes, 2015d). Other complications of illicit drug use include premature birth, smaller than normal head size, birth defects, heart defects, and infections. Additionally, babies born to mothers who use drugs may have problems later in life, including learning and behavior difficulties, slower than normal growth, and die from sudden infant death syndrome. Children of substance abusing parents are also

considered at high risk for a range of biological, developmental, academic, and behavioral problems, including developing substance abuse problems of their own (Conners, et al., 2003).

Women who use drugs or alcohol during pregnancy can cause serious lifelong harm to their child. Some people have advocated mandatory screenings for women who are pregnant and have a history of drug abuse, and if the women continue using, to arrest, prosecute, and incarcerate them (Figdor & Kaeser, 1998). This policy was tried in Charleston, South Carolina 20 years ago. The policy was called the Interagency Policy on Management of Substance Abuse During Pregnancy and had disastrous results: The Interagency Policy applied to patients attending the obstetrics clinic at MUSC, which primarily serves patients who are indigent or on Medicaid. It did not apply to private obstetrical patients. The policy required patient education about the harmful effects of substance abuse during pregnancy. A statement also warned patients that protection of unborn and newborn children from the harms of illegal drug abuse could involve the Charleston police, the Solicitor of the Ninth Judicial Court, and the Protective Services Division of the Department of Social Services (DSS). (Jos, Marshall, & Perlmutter, 1995, pp. 120–121) This policy seemed to deter women from seeking prenatal care, deterred them from seeking other social services, and was applied solely to low-income women, resulting in lawsuits. The program was canceled after 5 years, during which 42 women were arrested. A federal agency later determined that the program involved human experimentation without the approval and oversight of an institutional review board (IRB). In July 2014, Tennessee enacted a law that allows women who illegally use a narcotic drug while pregnant to be prosecuted for assault if her infant is harmed or addicted to the drug (National Public Radio, 2015). According to the National Public Radio report, a baby is born dependent on a drug every 30 minutes in Tennessee, which is a rate three times higher than the national average. However, since the law took effect the number of babies born having drug withdrawal symptoms has not diminished. Critics contend that the criminal

justice system should not be involved in what is considered a healthcare problem. What do you think? Is the issue of mothers using illicit drugs more of a legal or medical concern?

Teratogen	Potential Effects
Caffeine	Moderate amounts of caffeine (200 mg or around 12 ounces of coffee) appear to be safe during pregnancy. Some studies have shown a link between higher amounts of caffeine and miscarriage and preterm birth.[25]
Tobacco	Tobacco use has been associated with low birth weight, placenta previa, preterm delivery, fetal growth restriction, sudden infant death syndrome, cleft lip or palate, and later health problems (such as high blood pressure and diabetes).[26]
Alcohol	There is no safe amount of alcohol a woman can drink while pregnant. Alcohol can slow down the baby's growth, affect the baby's brain, and cause birth defects, and may results in fetal alcohol spectrum disorder (FASD). The effects can be mild to severe. Children born with a severe form of FASD can have abnormal facial features, severe learning disabilities, behavioral problems, and other problems.[27]
Cocaine	Cocaine use has connected with low birth weight, stillbirths, spontaneous abortion, placental abruption, premature birth, miscarriage, and neonatal abstinence syndrome (fetal addiction leads the newborn to experiences withdrawal).[28]
Marijuana	No amount of marijuana has been proven safe to use during pregnancy. Heavy use has been associated with brain damage, premature birth, and stillbirth.[29]
Heroin	Using heroin during pregnancy can cause birth defects, placental abruption, premature birth, low birthweight, neonatal abstinence syndrome, still birth, and sudden infant death syndrome.[30]
Over-the-Counter (OTC) medication	Some OTC medications are safe to use during pregnancy and others may cause health problems during pregnancy. Pregnant women should consult their health care provider before using OTC medications.[31]
Prescription drugs	Some prescription drugs can cause birth defects that change the shape or function of one or more parts of the body that can affect overall health. Pregnant women should consult their health care provider before discontinuing or starting new medications.[32]

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27. Staying healthy and safe by OWH is in the public domain
28. Chapter 3: Prenatal Development – Environmental Risks references Psyc 200 Lifespan Psychology by Laura Overstreet, which is licensed under CC BY 4.0; Prescription drugs, over-the-counter drugs, supplements and herbal products (n.d.). Retrieved from: https://www.marchofdimes.org/pregnancy/prescription-drugs-over-the-counter-drugs-supplements-and-herbal-products.aspx
29. Chapter 3: Prenatal Development – Environmental Risks references Psyc 200 Lifespan Psychology by Laura Overstreet, which is licensed under CC BY 4.0; Prescription drugs, over-the-counter drugs, supplements and herbal products (n.d.). Retrieved from: https://www.marchofdimes.org/pregnancy/prescription-drugs-over-the-counter-drugs-supplements-and-herbal-products.aspx
30. Prescription drugs, over-the-counter drugs, supplements and herbal products (n.d.). Retrieved from: https://www.marchofdimes.org/pregnancy/prescription-drugs-over-the-counter-drugs-supplements-and-herbal-products.aspx
31. Prescription drugs, over-the-counter drugs, supplements and herbal products (n.d.). Retrieved from: https://www.marchofdimes.org/pregnancy/prescription-drugs-over-the-counter-drugs-supplements-and-herbal-products.aspx
32. Prescription drugs, over-the-counter drugs, supplements and herbal products (n.d.). Retrieved from: https://www.marchofdimes.org/pregnancy/

Herbal or dietary supplements	Except for some vitamins, little is known about using herbal or dietary supplements while pregnant. Most often there are no good studies to show if the herb can cause harm to you or your baby. Also, some herbs that are safe when used in small amounts as food might be harmful when used in large amounts as medicines.[33]

Pollutants as Teratogens:

There are more than 83,000 chemicals used in the United States with little information on the effects of them during pregnancy (March of Dimes, 2016b).

- Lead: An environmental pollutant of significant concern is lead poisoning, which has been linked to fertility problems, high blood pressure, low birth weight, prematurity, miscarriage, and slowed neurological development. Grossman and Slutsky (2017) found that babies born in Flint Michigan, an area identified with high lead levels in the drinking water, were premature, weighed less than average, and gained less weight than expected.
- **Pesticides**: The chemicals in certain pesticides are also potentially damaging and may lead to birth defects, learning problems, low birth weight, miscarriage, and premature birth (March of Dimes, 2014).
- **Bisphenol** A: Prenatal exposure to bisphenol A (BPA), a chemical commonly used in plastics and food and beverage

prescription-drugs-over-the-counter-drugs-supplements-and-herbal-products.aspx
33. Chapter 3: Prenatal Development – Environmental Risks references Psyc 200 Lifespan Psychology by Laura Overstreet, which is licensed under CC BY 4.0

containers, may disrupt the action of certain genes contributing to certain birth defects (March of Dimes, 2016b).

- Radiation: If a mother is exposed to radiation, it can get into the bloodstream and pass through the umbilical cord to the baby. Radiation can also build up in body areas close to the uterus, such as the bladder. Exposure to radiation can slow the baby's growth, cause birth defects, affect brain development, cause cancer, and result in a miscarriage.
- Mercury: Mercury, a heavy metal, can cause brain damage and affect the baby's hearing and vision. This is why women are cautioned about the amount and type of fish they consume during pregnancy.
- **Environmental Teratogens**

Teratogen	Potential Effects
Lead	Exposure to high levels of lead before and during pregnancy can lead to high blood pressure, problems with fetal brain and nervous system development, premature birth, low birthweight, and miscarriage.[34]
Mercury	Exposure to mercury in the womb can cause brain damage and hearing and vision problems.[35]
Radiation	Exposure to radiation during pregnancy (especially between 2 and 18 weeks of pregnancy) can slow growth, cause birth defects, affect brain development, cause cancer, and cause miscarriage.[36]
Solvents	These chemicals include degreasers, paint thinners, stain and varnish removers, paints, and more Maternal inhalation of solvents can cause fetal exposure than may cause miscarriage, slow fetal growth, premature birth, and birth defects.[37]

34. Prescription drugs, over-the-counter drugs, supplements and herbal products (n.d.). Retrieved from: https://www.marchofdimes.org/pregnancy/ prescription-drugs-over-the-counter-drugs-supplements-and-he rbal-products.aspx
35. Prescription drugs, over-the-counter drugs, supplements and

Teratogens from Animals/Pets

Toxoplasmosis: The tiny parasite, toxoplasma gondii, causes an infection called toxoplasmosis. According to the March of Dimes (2012d), toxoplasma gondii infects more than 60 million people in the United States. A healthy immune system can keep the parasite at bay producing no symptoms, so most people do not know they are infected. As a routine prenatal screening frequently does not test for the presence of this parasite, pregnant women may want to talk to their health-care provider about being tested. Toxoplasmosis can cause premature birth, stillbirth, and can result in birth defects to the eyes and brain. While most babies born with this infection show no symptoms, ten percent may experience eye infections, enlarged liver and spleen, jaundice, and pneumonia. To avoid being infected, women should avoid eating undercooked or raw meat and unwashed fruits and vegetables, touching cooking utensils that touched raw meat or unwashed fruits and vegetables, and touching

herbal products (n.d.). Retrieved from: https://www.marchofdimes.org/pregnancy/prescription-drugs-over-the-counter-drugs-supplements-and-herbal-products.aspx

36. Prescription drugs, over-the-counter drugs, supplements and herbal products (n.d.). Retrieved from: https://www.marchofdimes.org/pregnancy/prescription-drugs-over-the-counter-drugs-supplements-and-herbal-products.aspx

37. Prescription drugs, over-the-counter drugs, supplements and herbal products (n.d.). Retrieved from: https://www.marchofdimes.org/pregnancy/prescription-drugs-over-the-counter-drugs-supplements-and-herbal-products.aspx

cat feces, soil or sand. If women think they may have been infected during pregnancy, they should have their baby tested.

Teratogens from Animals/Pets

Teratogen	Potential Effects
Toxoplamosis	This parasite can be passed through cat feces and undercooked meat (especially pork, lamb, or deer meet). If the fetus is infected it can cause miscarriage, stillbirth, hydrocephalus, macro or microcephalus, vision issues, and damage to the nervous system.[38]
Lymphocytic choriomeningitis	This virus carried by rodents including mice, hamsters, and guinea pigs. If an infected mother passes it to her fetus it can cause issues with brain development, long-term neurological and/or visual impairment, and higher mortality rates after birth.[39]

Maternal Infections as Teratogens

Sexually Transmitted Diseases: Gonorrhea, syphilis, and chlamydia are sexually transmitted infections that can be passed to the fetus by an infected mother. Mothers should be tested as early as possible

38. Prescription drugs, over-the-counter drugs, supplements and herbal products (n.d.). Retrieved from: https://www.marchofdimes.org/pregnancy/ prescription-drugs-over-the-counter-drugs-supplements-and-he rbal-products.aspx
39. Prescription drugs, over-the-counter drugs, supplements and herbal products (n.d.). Retrieved from: https://www.marchofdimes.org/pregnancy/ prescription-drugs-over-the-counter-drugs-supplements-and-he rbal-products.aspx

to minimize the risk of spreading these infections to their unborn child. Additionally, the earlier the treatment begins, the better the health outcomes for mother and baby (CDC, 2016d). Sexually transmitted diseases (STDs) can cause premature birth, premature rupture of the amniotic sac, an ectopic pregnancy, birth defects, miscarriage, and still births (March of Dimes, 2013). Most babies become infected with STDS while passing through the birth canal during delivery, but some STDs can cross the placenta and infect the developing fetus.

Human Immunodeficiency Virus (HIV): One of the most potentially devastating teratogens is HIV. HIV and Acquired Immune Deficiency Syndrome (AIDS) are leading causes of illness and death in the United States (Health Resources and Services Administration, 2015). One of the main ways children under age 13 become infected with HIV is via mother-to-child transmission of the virus prenatally, during labor, or by breastfeeding (CDC, 2016c). There are some measures that can be taken to lower the chance the child will contract the disease. HIV positive mothers who take antiviral medications during their pregnancy greatly reduce the chance of passing the virus to the fetus. The risk of transmission is less than 2 percent; in contrast, it is 25 percent if the mother does not take antiretroviral drugs (CDC, 2016b). However, the long-term risks of prenatal exposure to the medication are not known. It is recommended that women with HIV deliver the child by c-section, and that after birth they avoid breast feeding.

German measles (or rubella): Rubella, also called German measles, is an infection that causes mild flu-like symptoms and a rash on the skin. However, only about half of children infected have these symptoms, while others have no symptoms (March of Dimes, 2012a). Rubella has been associated with a number of birth defects. If the mother contracts the disease during the first three months of pregnancy, damage can occur in the eyes, ears, heart or brain of the unborn child. Deafness is almost certain if the mother has German measles before the 11th week of prenatal development and can also cause brain damage. Women in the United States are much less

likely to be afflicted with rubella, because most women received childhood vaccinations that protect her from the disease.[40]

Maternal Infections as Teratogens

Teratogen	Potential Effects
Rubella	Congenital infection (becoming infected while in the womb) can damage the development of the eyes, ears, heart, and brain and result in deafness.[41]
Zika	Congenital infection can cause microcephaly and other severe brain abnormalities.[42]
Varicella (chicken pox)	Congenital infection can cause a severe form of the infection affecting the eyes, limbs, skin, and central nervous system.[43]
Sexually transmitted infections	Infections such as HIV, gonorrhea, syphilis, and chlamydia can be passed from the mother during pregnancy and/or delivery.[44]
Listeria	Pregnant women are more susceptible to this food-borne illness. Congenital infection can cause miscarriage, stillbirth, premature labor, and neonatal sepsis.[45]

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41. Chapter 3: Prenatal Development – Environmental Risks references Psyc 200 Lifespan Psychology by Laura Overstreet, which is licensed under CC BY 4.0
42. Protocols on prenatal care for pregnant women with Zika infection and children with microcephaly: nutritional approach by Rachel de Sá Barreto Luna Callou Cruz, Malaquias Batista Filho, Maria de Fátima Costa Caminha, and Edvaldo da Silva Souza is licensed under CC BY 4.0
43. Congenital Varicella syndrome by WikiDoc is licensed under CC BY-SA 3.0
44. Chapter 3: Prenatal Development – Environmental Risks references Psyc 200 Lifespan Psychology by Laura Overstreet, which is

Other Maternal Factors

There are additional factors that affect the outcome of pregnancy for both mother and child. Let's look at these next.

Mothers over 35

Most women over 35 who become pregnant are in good health and have healthy pregnancies. However, according to the March of Dimes (2016d), women over age 35 are more likely to have an increased risk of:

- Fertility problems
- High blood pressure
- Diabetes
- Miscarriages
- Placenta Previa
- Cesarean section
- Premature birth
- Stillbirth
- A baby with a genetic disorder or other birth defects

Because a woman is born with all her eggs, environmental teratogens can affect the quality of her eggs as a woman gets older. Also, a woman's reproductive system ages which can adversely affect the pregnancy. Some women over 35 choose special prenatal screening tests, such as a maternal blood screening, to determine if there are any health risks for the baby.

Although there are medical concerns associated with having a child later in life, there are also many positive consequences to being a more mature parent. Older parents are more confident, less stressed, and typically married, providing family stability. Their

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45. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2860824/

children perform better on math and reading tests, and they are less prone to injuries or emotional troubles (Albert, 2013). Women who choose to wait are often well educated and lead healthy lives. According to Gregory (2007), older women are more stable, demonstrate a stronger family focus, possess greater self-confidence, and have more money. Having a child later in one's career equals overall higher wages. In fact, for every year a woman delays motherhood, she makes 9% more in lifetime earnings. Lastly, women who delay having children live longer.[46]

Teenage Pregnancy: A teenage mother is at a greater risk for having pregnancy complications including anemia, and high blood pressure. These risks are even greater for those under age 15. Infants born to teenage mothers have a higher risk for being premature and having low birthweight or other serious health problems. Premature and low birthweight babies may have organs that are not fully developed which can result in breathing problems, bleeding in the brain, vision loss, and serious intestinal problems. Very low birthweight babies (less than 3 1/3 pounds) are more than 100 times as likely to die, and moderately low birthweight babies (between 3 1/3 and 5 ½ pounds) are more than 5 times as likely to die in their first year, than normal weight babies (March of Dimes, 2012c). Again, the risk is highest for babies of mothers under age 15. Reasons for these health issues include that teenagers are the least likely of all age groups to get early and regular prenatal care. Additionally, they may engage in negative behaviors including eating unhealthy food, smoking, drinking alcohol, and taking drugs. Additional concerns for teenagers are repeat births. About 25% of teen mothers under age 18 have a second baby within 2 years after the first baby's birth.

Gestational Diabetes: Seven percent of pregnant women develop

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gestational diabetes (March of Dimes, 2015b). Diabetes is a condition where the body has too much glucose in the bloodstream. Most pregnant women have their glucose level tested at 24 to 28 weeks of pregnancy. Gestational diabetes usually goes away after the mother gives birth, but it might indicate a risk for developing diabetes later in life. If untreated, gestational diabetes can cause premature birth, stillbirth, the baby having breathing problems at birth, jaundice, or low blood sugar. Babies born to mothers with gestational diabetes can also be considerably heavier (more than 9 pounds) making the labor and birth process more difficult. For expectant mothers, untreated gestational diabetes can cause preeclampsia, a complication that results in high blood pressure and signs of damage to other organs, most commonly the liver and kidneys. Risk factors for gestational diabetes include age (being over age 25), being overweight or gaining too much weight during pregnancy, family history of diabetes, having had gestational diabetes with a prior pregnancy, and race and ethnicity (African-American, Native American, Hispanic, Asian, or Pacific Islander have a higher risk). Eating healthy and maintaining a healthy weight during pregnancy can reduce the chance of gestational diabetes. Women who already have diabetes and become pregnant need to make sure to attend all their prenatal care visits, and follow the same advice as those for women with gestational diabetes as the risk of preeclampsia, premature birth, birth defects, and stillbirth are the same.

High Blood Pressure (Hypertension): Hypertension is a condition in which the pressure against the wall of the arteries becomes too high. There are two types of high blood pressure that can result during pregnancy, gestational and chronic. **Gestational hypertension** only occurs during pregnancy and goes away after birth. **Chronic high blood** pressure refers to women who already had hypertension before the pregnancy or to those who developed it during pregnancy, and it continued after birth. According to the March of Dimes (2015c) about 8 in every 100 pregnant women have high blood pressure. High blood pressure during pregnancy can

cause premature birth and low birth weight (under five and a half pounds), placental abruption, and preeclampsia.

Rh Disease: Rh is a protein found in the blood. Most people are Rh positive, meaning they have this protein. Some people are Rh negative, meaning this protein is absent. Mothers who are Rh negative are at risk of having a baby with a form of anemia called Rh disease (March of Dimes, 2009). A father who is Rh-positive and mother who is Rh-negative can conceive a baby who is Rh-positive. In this case, some of the fetus's blood cells may get into the mother's bloodstream and her immune system is unable to recognize the Rh factor. The immune system starts to produce antibodies to fight off what it thinks is a foreign invader. Once her body produces immunity, the antibodies can cross the placenta and start to destroy the red blood cells of the developing fetus. As this process takes time, often the first Rh positive baby is not harmed, but as the mother's body will continue to produce antibodies to the Rh factor across her lifetime, subsequent pregnancies can pose greater risk for an Rh positive baby. In the newborn, Rh disease can lead to jaundice, anemia, heart failure, brain damage and death.

Weight Gain during Pregnancy: According to March of Dimes (2016f) during pregnancy most women need only an additional 300 calories per day to aid in the growth of the fetus. Gaining too little or too much weight during pregnancy can be harmful. Women who gain too little weight may have a baby who is low-birth weight, while those who gain too much are likely to have a premature or large baby. There is also a greater risk for the mother developing preeclampsia and diabetes, which can cause further problems during the pregnancy, so putting on the weight slowly is best. Mothers who are concerned about their weight gain should talk to

their health care provider.[47] The table below shows healthy weight gain during pregnancy.

Weight Gain During Pregnancy[48]

If you were a healthy weight before pregnancy:	If you were underweight before pregnancy:	If you were overweight before pregnancy:	If you were obese before pregnancy:
- Gain 25-35 pounds 1-4½ pounds in the 1st trimester 1 pound per week in the 2nd and 3rd trimesters	- Gain 28-30 pounds 1-4½ pounds in the 1st trimester - A little more than 1 pound per week thereafter	- Gain 12-25 pounds 1-4½ pounds in the 1st trimester - A little more than ½ pound per week in 2nd and 3rd trimesters	11-20 pounds 1-4½ pounds in the 1st trimester - A little more than ½ pound per week in 2nd and 3rd trimesters
Mothers of twins or higher order multiples need to gain more in each category.			

Stress: Feeling stressed is common during pregnancy, but high levels of stress can cause complications including having a premature baby or a low-birthweight baby. Babies born early or too small are at an increased risk for health problems. Stress-related hormones may cause these complications by affecting a woman's immune systems resulting in an infection and premature birth. Additionally, some women deal with stress by smoking, drinking alcohol, or taking drugs, which can lead to problems in the pregnancy. High levels of stress in pregnancy have also been correlated with problems in the baby's brain development and immune system functioning, as well as childhood problems such as trouble paying attention and being afraid (March of Dimes, 2012b).

Depression: Depression is a significant medical condition in which feelings of sadness, worthlessness, guilt, and fatigue interfere with

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48. Children's Development by Ana R. Leon is licensed under

one's daily functioning. Depression can occur before, during, or after pregnancy, and 1 in 7 women is treated for depression sometime between the year before pregnancy and year after pregnancy (March of Dimes, 2015a). Women who have experienced depression previously are more likely to have depression during pregnancy. Consequences of depression include the baby being born premature, being low birthweight, being more irritable, less active, less attentive, and having fewer facial expressions. About 13% of pregnant women take an antidepressant during pregnancy. It is important that women taking antidepressants during pregnancy discuss the medication with a health care provider as some medications can cause harm to the developing organism. In fact, birth defects happen about 2 to 3 times more often in women who are prescribed certain Selective Serotonin Reuptake Inhibitors (SSRIs) for their depression.

Paternal Impact

The age of fathers at the time of conception is also an important factor in health risks for children. According to Nippoldt (2015) offspring of men over 40 face an increased risk of miscarriages, autism, birth defects, **achondroplasia** (bone growth disorder) and schizophrenia. These increased health risks are thought to be due to accumulated chromosomal aberrations and mutations during the maturation of sperm cells in older men (Bray, Gunnell, & Smith, 2006). However, like older women, the overall risks are small.

In addition, men are more likely than women to work in occupations where hazardous chemicals, many of which have teratogenic effects or may cause genetic mutations, are used (Cordier, 2008). These may include petrochemicals, lead, and pesticides that can cause abnormal sperm and lead to miscarriages or diseases. Men are also more likely to be a source of secondhand smoke for their developing offspring. As noted earlier, smoking by

either the mother or around the mother can hinder prenatal development.[49]
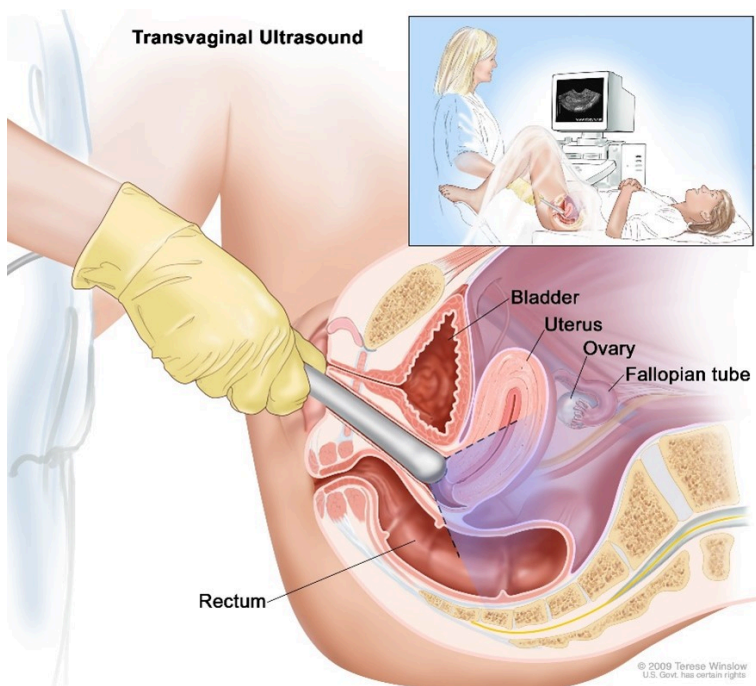
Prenatal Assessment

A number of assessments are suggested to women as part of their routine prenatal care to find conditions that may increase the risk of complications for the mother and fetus (Eisenberg, Murkoff, & Hathaway, 1996). These can include blood and urine analyses and screening and diagnostic tests for birth defects.

Ultrasound is one of the main screening tests done in combination with blood tests. The ultrasound is a test in which sound waves are used to examine the fetus. There are two general types. Transvaginal ultrasounds are used in early pregnancy, while transabdominal ultrasounds are more common and used after 10 weeks of pregnancy (typically, 16 to 20 weeks).[50]

Transvaginal Ultrasound

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Transvaginal Ultrasound

Bladder
Uterus
Ovary
Fallopian tube
Rectum

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Transvaginal ultrasound. An ultrasound probe connected to a computer is inserted into the vagina and is gently moved to show different organs. The probe bounces sound waves off internal organs and tissues to make echoes that form a sonogram (computer picture).[51]

51. Image and text from National Institute of Health, National Cancer Institute Dictionary of Cancer Terms. Public Domain.

A woman receiving a transabdominal ultrasound[52]

Ultrasounds are used to check the fetus for defects or problems. It can also find out the age of the fetus, location of the placenta, fetal position, movement, breathing and heart rate, amount of amniotic fluid in the uterus, and number of fetuses. Most women have at least one ultrasound during pregnancy, but if problems are noted, additional ultrasounds may be recommended.[53]

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yawn

4-D Ultrasound of a fetus yawning[54]

When diagnosis of a birth defect is necessary, ultrasounds help guide the more invasive diagnostic tests of **amniocentesis** and **chorionic villus sampling**. Amniocentesis is a procedure in which a needle is used to withdraw a small amount of amniotic fluid and cells from the sac surrounding the fetus and later tested.[55]
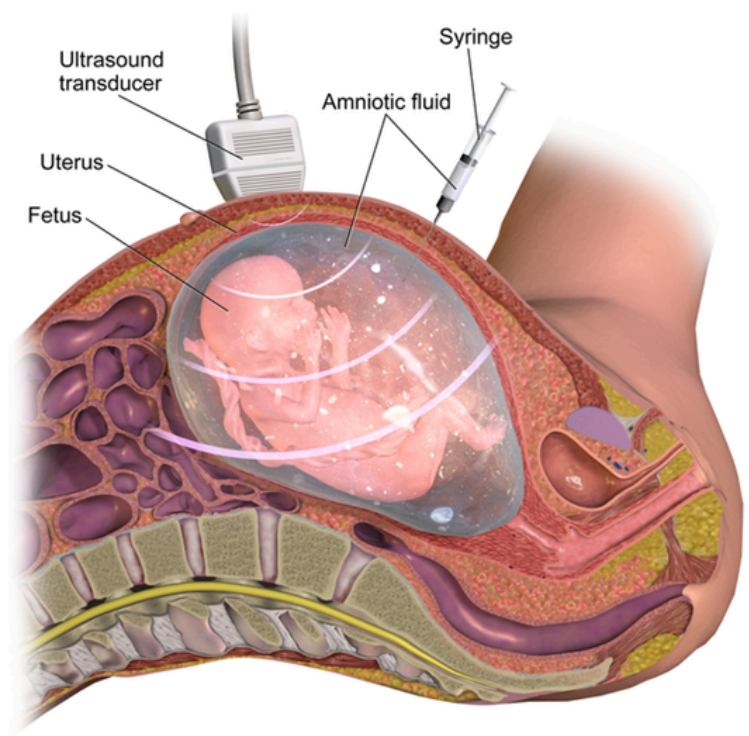
Amniocentesis[56]

54. Image by Wolfgand Moroder.theora.ogv and is licensed under CC BY SA 3.0
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56. Image by BruceBlaus is licensed under CC BY-SA 4.0

Ultrasound transducer
Syringe
Amniotic fluid
Uterus
Fetus

Chorionic Villus Sampling

The **chorion** is the portion of fetal membrane that eventually forms the fetal side of the placenta. The chorion contains chorionic villi, which are small finger-like projections. These villi are snipped or suctioned off for study in the procedure. Since the chorionic villi are of fetal origin, examining samples of them can provide the genetic makeup of the fetus. This test is performed to identify congenital defects. Experts use the sample to study the DNA, chromosomes,

and enzymes of the fetus. The test can be done before amniocentesis, about 10 to 12 weeks after a missed period.[57]

CVS can be done through the cervix (transcervical) or through the belly (transabdominal). Miscarriage rates are slightly higher when the test is done through the cervix.

The transcervical procedure is performed by inserting a thin plastic tube through the vagina and cervix to reach the placenta. Your health care provider uses ultrasound images to help guide the tube into the best area for sampling. A small sample of chorionic villus (placental) tissue is then removed.

The transabdominal procedure is performed by inserting a needle through the abdomen and uterus and into the placenta. Ultrasound is used to help guide the needle, and a small amount of tissue is drawn into the syringe.[58]

Transcervical Chorionic Villus Sampling[59]

Chorionic Villus Sampling
- catheter inserted through vagina into uterus to sample villi of placenta
- more fetal cells, earlier in pregancy
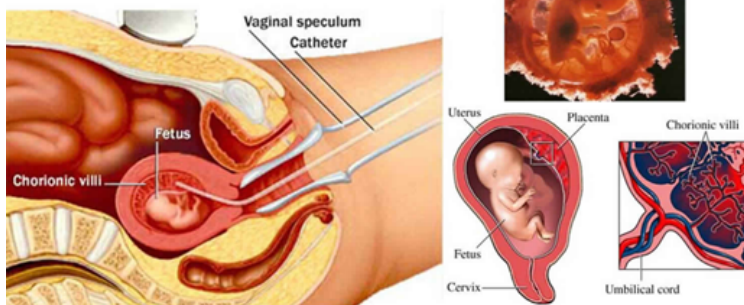
57. Courtesy of MedlinePlus from the National Library of Medicine
58. Courtesy of MedlinePlus from the National Library of Medicine
59. Image courtesy of Health JADE as fair use

Transabdominal Chorionic Villus Sampling[60]
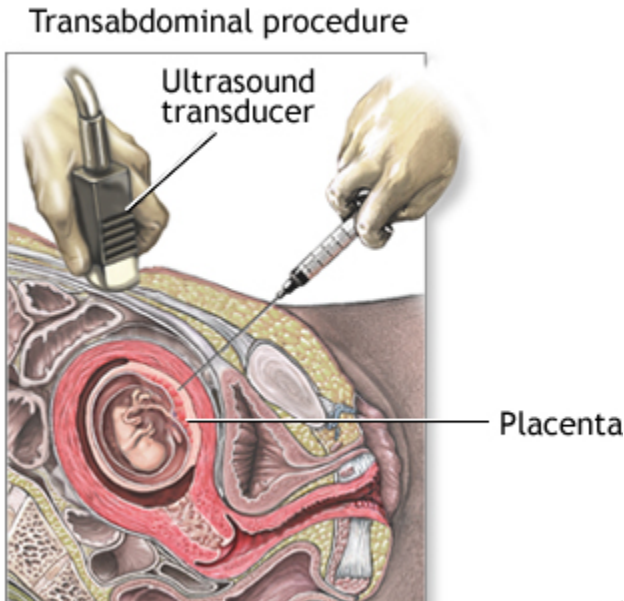
First-Trimester Screening

A **first-trimester screening** combines the use of transabdominal ultrasound and a blood test during the first trimester of pregnancy (week 1 through 13), and is usually done between week's 11 and 13. Using ultrasound a **Nuchal Translucency Test** is performed to measure the amount of fluid and thickness around the area of the back of the baby's neck (this area is called the nuchal fold). This test can determine if there is a chance of certain birth defects like Down's Syndrome, Patau's Synderome (trisomy 13), and Edward's Syndrome (trisomy 18) being present. However, the nuchal

translucency screening on its own is not good enough to make a diagnosis. The Nuchal translucency test correctly identifies Down Syndrome in approximately 64 to 70 percent of the time but fails to identify Down's Syndrome approximately 30 to 36 percent of the time. To improve the accuracy of the nuchal translucency screening, two blood tests will also be taken.
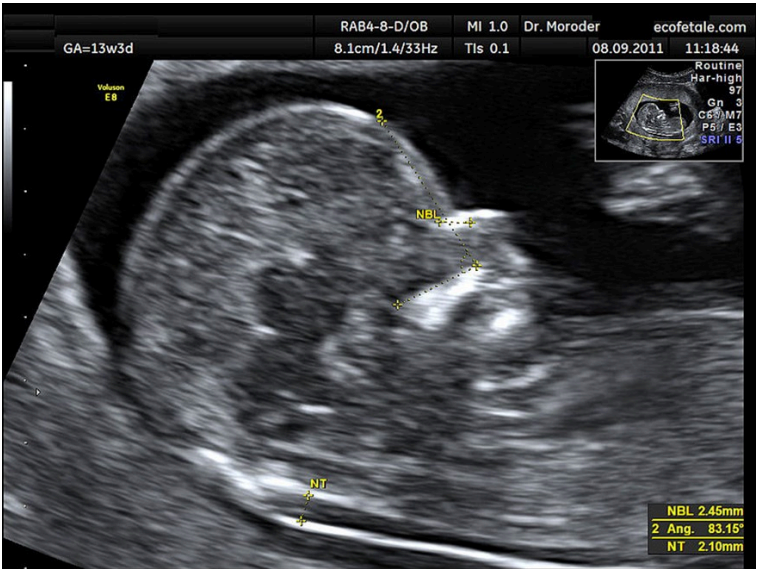
Ultrasound image of measurements of fetal nuchal translucency at 13 weeks. The area marked NT on the ultrasound image shows the Nuchal fold area which is measured for fluid and thickness. Babies with increased fluid in this area are at a higher risk for having Down's Syndrome, Patau's Syndrome (trisomy 13), and Edward's Syndrome (trisomy 18). A normal measurement of the

nuchal fold at 13 weeks is approximately 3mm.[61]

The blood tests measure two different substances that are found in the blood of all pregnant women, the pregnancy-associated plasma protein or (PAPP-A) and human-chorionic gonadotropin (Beta-hCG). PAPP-A is a protein produced by the placenta early in the pregnancy and can be found in the protein of the mom's blood. Low levels of PAPP-A may be associated with birth defects. Beta-gCG is a hormone produced by the placenta also in early pregnancy. High or low levels of Beta-gCG may be related to certain birth defects. When the PAPP-A and Beta-gCG blood tests are combined with the results of the Nuchal translucency test the combined results correctly identifies Down's syndrome approximately 82 to 87 percent of the time. A quad screening (another type of blood test) performed during the second trimester increases the ability to detect Down's Syndrome to approximately 96%.

Complications of Pregnancy

Minor complications: There are a number of common side effects of pregnancy. Not everyone experiences all of these, nor to the same degree. And although they are considered "minor" this is not to say that these problems are not potentially very uncomfortable.

61. Image and text (modified by Maria Pagano) from Wikimedia Commons: File: Nuchal translucency Dr. Wolfgang Moroder. Licensed under CC-BY-SA 3.0

These side effects include nausea (particularly during the first 3-4 months of pregnancy as a result of higher levels of estrogen in the system), heartburn, gas, hemorrhoids, backache, leg cramps, insomnia, constipation, shortness of breath or varicose veins (as a result of carrying a heavy load on the abdomen).

Major Complications: The following are some serious complications of pregnancy which can pose health risks to mother and child and that often require hospitalization.

Spontaneous abortion is experienced in an estimated 20-40 percent of undiagnosed pregnancies and in another 10 percent of diagnosed pregnancies. Usually, the body aborts due to chromosomal abnormalities, and this typically happens before the 12th week of pregnancy. Cramping and bleeding result and normal periods return after several months. Some women are more likely to have repeated miscarriages due to chromosomal, amniotic, or hormonal problems, but miscarriage can also be a result of defective sperm (Carrell et. al., 2003).[62]

Ectopic Pregnancy occurs when the zygote becomes attached to the fallopian tube before reaching the uterus. About 1 in 50 pregnancies in the United States are tubal pregnancies and this number has been increasing because of the higher rates of pelvic inflammatory disease and Chlamydia (Carroll, 2007). Abdominal pain, vaginal bleeding, nausea and fainting are symptoms of ectopic pregnancy.[63]

62. Lifespan Development: A Psychological Perspective by Martha Lally and Suzanne Valentine-French is licensed under CC BY-NC-SA 3.0
63. Lifespan Development: A Psychological Perspective by Martha Lally and Suzanne Valentine-French is licensed under CC BY-NC-SA 3.0

Uterus · Embryo · Fallopian Tube · Ovary

An ectopic pregnancy[64]

Hyperemesis gravidarum is characterized by severe nausea, vomiting, weight loss, and possibly dehydration. Signs and symptoms may also include vomiting many times a day and feeling faint. The exact causes of hyperemesis gravidarum are unknown. Risk factors include the first pregnancy, multiple pregnancy, obesity, prior or family history of HG, trophoblastic disorder, and a history of eating disorders. Treatment includes drinking fluids and a bland diet. Medication, intravenous fluids, and hospitalization may be required. Hyperemesis gravidarum is estimated to affect 0.3–2.0% of pregnant women. Those affected have a low risk of miscarriage but a higher risk of premature birth.

64. Image by Takatakatakumi is licensed under CC BY-SA 3.0

Preeclampsia (briefly discussed earlier in the chapter) , also known as Toxemia, is characterized by a sharp rise in blood pressure, a leakage of protein into the urine as a result of kidney problems, and swelling of the hands, feet, and face during the third trimester of pregnancy. Preeclampsia is the most common complication of pregnancy. It is estimated to affect 5% to 10% of all pregnancies globally and accounts for 40% to 60% of maternal deaths in developing countries (National Institute of Child Health and Human Development, 2013). Rates are lower in the United States and preeclampsia affects about 3% to 5% of pregnant women.

Preeclampsia occurs most frequently in first pregnancies, and it is more common in women who are obese, have diabetes, or are carrying twins. When preeclampsia causes seizures, the condition is known as eclampsia, which is the second leading cause of maternal death in the United States. Preeclampsia is also a leading cause of fetal complications, which include low birth weight, premature birth, and stillbirth. Treatment is typically bed rest and sometimes medication. If this treatment is ineffective, labor may be induced.

Maternal Mortality: According to the CDC (2019), about 700 American women die from complications related to pregnancy each year, and this number is rising. Further, 60% of those deaths could have been prevented. Bleeding, infections, and heart-related problems are the main causes. Possible contributing factors include the high caesarean section rate and obesity. Compared to other developed nations, this number is considered high. Approximately 1000 women die in childbirth around the world each day (World Health Organization, 2010). Rates are highest in Sub-Saharan Africa and South Asia, although there has been a substantial decrease in these rates. The campaign to make childbirth safe for everyone has led to the development of clinics accessible to those living in more isolated areas and training more midwives to assist in childbirth.

Infertility and Building Families

Infertility

When a couple has failed to conceive a child in a year, they receive the diagnosis of infertility. Infertility affects about 10 to 15 percent of couples in the United States (Mayo Clinic, 2015).

Male factors create infertility in about a third of the cases. For men, the most common cause is a lack of sperm production or low sperm production.

Female factors cause infertility in another third of cases. For women, one of the most common causes of infertility is the failure to ovulate. Another cause of infertility in women Pelvic Inflammatory Disease (PID), which is an infection of a woman's reproductive organs (Carroll, 2007).

Both male and female factors contribute to the remainder of cases of infertility.[65]

Options for Building Families

There are numerous options to pursue parenthood and building families. Let's briefly explore some of these.

Assisted Reproductive Technology

Assisted reproductive technology (ART) is the technology used to achieve pregnancy in procedures such as fertility medication (to stimulate ovulation), surgical procedures, artificial insemination IUI), in vitro fertilization (IVF) and surrogacy. These options are available for people who are experiencing infertility or cannot conceive children naturally (which also includes single parents, and gay/lesbian couples).[66]
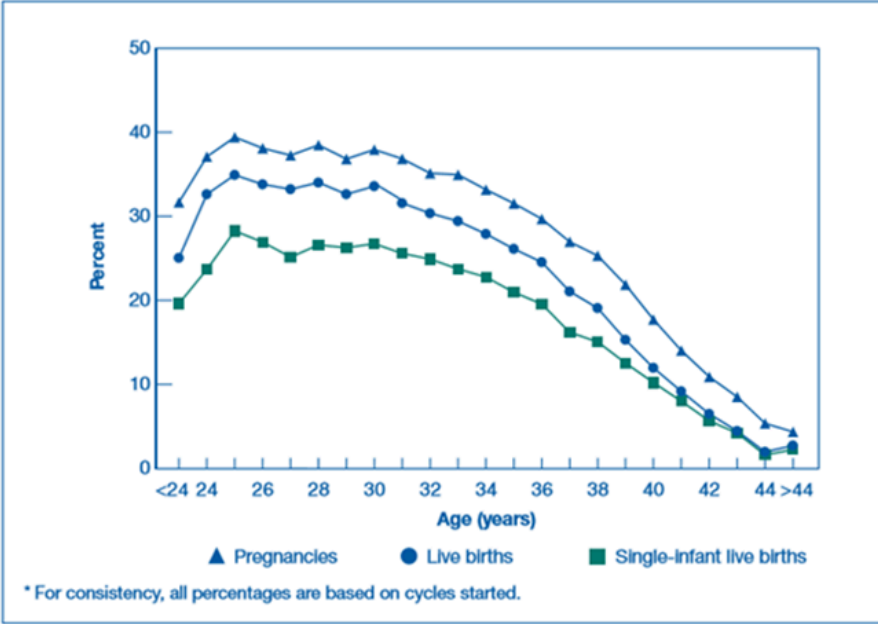
65. Lifespan Development: A Psychological Perspective (page 57) by Martha Lally and Suzanne Valentine-French is licensed under CC BY-NC-SA 3.0
66. Assisted Reproductive Technology by Fertilitypedia is licensed under CC BY-SA 4.0

The line graph above shows the percentages of ART cycles using fresh embryos from fresh nondonor eggs in 2016 that resulted in pregnancies, live births, and single-infant live births declined among women in their 30s onward. A woman's age is the most important factor for having a live birth when her own eggs are used. Percentages of ART cycles resulting in total live births and births of a single live infant are different because multiple-infant deliveries count towards the total live births.[68]

Intrauterine insemination: (IUI) as a type of artificial insemination involves the placement of sperm directly into the uterus at the time of ovulation, either in a natural menstrual cycle or following ovarian stimulation.[69]

In vitro fertilization (IVF): IVF generally starts with stimulating the ovaries to increase egg production. Most fertility medications are agents that stimulate the development of follicles in the ovary. Examples are gonadotropins and gonadotropin releasing hormone. After stimulation, the physician surgically extracts one or more eggs from the ovary, and unites them with sperm in a laboratory setting, with the intent of producing one or more embryo. Fertilization takes place outside the body, and the fertilized egg is reinserted into the woman's reproductive tract, in a procedure called embryo transfer.[70]

The IVF process.[71]

67. Centers for Disease Control and Prevention, American Society for
    Reproductive Medicine, society for Assisted Reproductive
    Technology. 2016 *Assisted Reproductive Technology National
    Summary Report*. Atlanta (GA): US Dept. of Health and Human
    Services;2018
68. Centers for Disease Control and Prevention, American Society for
    Reproductive Medicine, society for Assisted Reproductive
    Technology. 2016 *Assisted Reproductive Technology National
    Summary Report*. Atlanta (GA): US Dept. of Health and Human
    Services;2018
69. Intrauterine Insemination by Fertilitypedia is licensed under CC
    BY-SA 4.0

70. Assisted Reproductive Technology by Fertilitypedia is licensed under CC BY-SA 4.0
71. Image by Manu5 is licensed under CC BY-SA 4.0

Donor Gametes & Embryos: People can also use sperm, ova (eggs), and embryos from donors in conjunction with ART. These donations take place through agencies and donor banks or between private individuals. In the U.S., donors can be compensated for their donations.

Surrogacy: In surrogacy, one woman (surrogate mother) carries a child for another person/s (commissioning person/couple), based on a legal agreement before conception requiring the child to be relinquished to the commissioning person/couple following birth. There are different types of surrogacies which relate to whether or not the ova used to conceive the child are her own (**traditional surrogacy**) or not (**gestational surrogacy**).[72]

Adoption: People can also choose to pursue **adoption** to build their families (with or without experiencing infertility). Adoption can take place through the foster care system, privately, or through agencies. Adoptions can be domestic (within the U.S.) or international. And they can be open (with differing amounts of contact between biological/birth families and adoptive families) or closed.

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72. Surrogacy by Fertilitypedia is licensed under CC BY-SA 4.0

5. Birth and the Newborn

Preparing for Childbirth

Prepared childbirth refers to being not only in good physical condition to help provide a healthy environment for the baby to develop, but also helping individuals to prepare to accept their new roles as parents. Additionally, parents can receive information and

training that will assist them for delivery and life with the baby. The more future parents can learn about childbirth and the newborn, the better prepared they will be for the adjustment they must make to a new life. [1]

Choosing Where to Have the Baby and Who Will Deliver

In 1900, almost all U.S. births occurred outside a hospital; however, the proportion of out-of-hospital births fell to 44% by 1940 and to 1% by 1969, where it remained through the 1980s.[2] Today, most births occur in a hospital setting. However, one percent of women continue to choose to deliver at home (Martin, Hamilton, Osterman, Curtin, & Mathews, 2015). Women who are at low risk for birth complications can successfully deliver at home. More than half (67%) of home deliveries are assisted by certified nurse midwifes. Midwives are trained and licensed to assist in delivery and are far less expensive than the cost of a hospital delivery. However, because of the potential for a complication during the birth process, most medical professionals recommend that delivery take place in a hospital. Despite the concerns, in the United States women who have had previous children, who are over 25, and who are white are more likely to have out-of-hospital births (MacDorman, Menacker, & Declercq, 2010). In addition to home births, one-third of out-

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1. Children's Development by Ana R. Leon is licensed under CC BY 4.0
2. MacDorman MF, Mathews TJ, Declercq E. Trends in out-of-hospital births in the United States, 1990–2012. NCHS data brief, no 144. Hyattsville, MD: National Center for Health Statistics. 2014. Public Domain.

of-hospital births occur in freestanding clinics, birthing centers, in physician's offices, or other locations.[3]
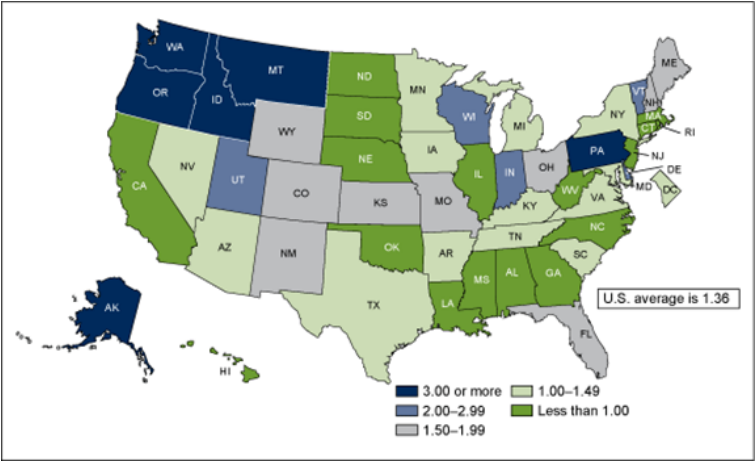
Percentage of Births Occurring Out-of-Hospital by State: 2012[4]Type your textbox content here.

3. Lifespan Development: A Psychological Perspective by Martha Lally and Suzanne Valentine-French is licensed under CC BY-NC-SA 3.0
4. MacDorman MF, Mathews TJ, Declercq E. Trends in out-of-hospital births in the United States, 1990–2012. NCHS data brief, no 144. Hyattsville, MD: National Center for Health Statistics. 2014. Public Domain

Approaches to Childbirth

There are many different approaches to childbirth that influence how expectant parents prepare. The two most common approaches to childbirth in the United States are the **Lamaze method** and the **Bradley method**.[5]

While both the Lamaze method and the Bradley method differ in their philosophy and focus each prepares the mother for natural childbirth. The Lamaze method emphasizes teaching the woman to be in control of the process of delivery, and to view childbirth as a natural process. While Lamaze classes do not discourage or support the use of medical intervention during childbirth, expecting moms are taught to reduce the pain associated with labor by using techniques such as, muscle relaxation, breathing through contractions, and having a focal point (usually a picture to look at) of concentration to distract from the pain of labor. In addition, the Lamaze technique suggests that a support person go through the six to eight week training classes with the mom and be prepared to serve as a coach during delivery process.

On the other hand, the Bradley method or husband-coached birth focuses on preparing the mother to deliver without the use of medical interventions. Like the Lamaze method, the Bradley method focuses on reducing pain and staying relaxed. Father's play a much more active role in the coaching process than in the Lamaze method, and Dads are expected to practice breathing and massage techniques with their partner.[6]

5. Children's Development by Ana R. Leon is licensed under CC BY 4.0 (Modified by Maria Pagano).
6. Lifespan Development: A Psychological Perspective by Martha Lally and Suzanne Valentine-French is licensed under CC BY-NC-SA 3.0 (Modified by Maria Pagano)

Additional Approaches to Childbirth[7]

Method	Description
The Leboyer Method	This method involves giving birth in a quiet, dimly lit room and allowing the newborn to lie on the mother's stomach with the umbilical cord intact for several minutes while being given a warm bath.
Dick-Read Method	This method comes from the suggestion that the fear of childbirth increases tension and makes the process of childbearing more painful. It emphasizes the use of relaxation and proper breathing with contractions as well as family support and education. This method influenced the Lamaze method of childbirth.
Alexander Technique	This is a technique that can be used during childbirth that involves training to stop habitual reactions to pain, such as tensing muscles and increase conscious awareness and control over posture and movement. This involves being able to move freely and stay upright during labor and using body positioning that is beneficial to the labor process.[8]
Waterbirth	Involves immersion in warm water. Proponents believe this method is safe and provides many benefits for both mother and infant, including pain relief and a less traumatic birth experience for the baby. However, critics argue that the procedure introduces unnecessary risks to the infant such as infection and water inhalation.[9]
Lotus Birth	Or **umbilical cord nonseverance** – UCNS, is the practice of leaving the umbilical cord uncut after childbirth so that the baby is left attached to the placenta until the cord naturally separates at the umbilicus. This usually occurs within 3–10 days after birth. The practice is performed mainly for spiritual purposes of the parents, including for the perceived spiritual connection between placenta and newborn.[10]
Silent Birth	Sometimes known as quiet birth, is a birthing procedure advised by L. Ron Hubbard and advocated by Scientologists in which "everyone attending the birth should refrain from spoken words as much as possible."[11]

7. Lifespan Development: A Psychological Perspective by Martha Lally and Suzanne Valentine-French is licensed under CC BY-NC-SA 3.0

8. Machover, Ilana. (n.d.). *The Alexander Technique in Natural Childbirth*. Retrieved from https://www.alexandertechnique.com/articles/childbirth/.

Expectant parents in a childbirth preparation class[12]

9. Water Birth by Wikidoc is licensed under CC BY-SA 3.0

10. Lotus Birth by Wikipedia is licensed under CC BY-SA 3.0

11. Silent Birth by Wikipedia is licensed under CC BY-SA 3.0

12. Image by liz.schrenk is licensed under CC BY-NC-ND 2.0

Childbirth

Onset of Labor

Childbirth typically occurs within a week of a woman's due date, unless the woman is pregnant with more than one fetus, which usually causes her to go into labor early. As a pregnancy progresses into its final weeks, several physiological changes occur in response to hormones that trigger labor.

A common sign that labor is beginning is the so-called **bloody show**. During pregnancy, a **plug of mucus** accumulates in the **cervical canal**, blocking the entrance to the uterus. Approximately 1–2 days prior to the onset of true labor, this plug loosens and is expelled, along with a small amount of blood.

As labor nears, the mothers' **pituitary gland** produces **oxytocin**. This begins to stimulate stronger, more painful uterine contractions, which—in a positive feedback loop—stimulate the secretion of **prostaglandins** from **fetal membranes**. Like oxytocin, prostaglandins also enhance uterine contractile strength. The fetal pituitary gland also secretes oxytocin, which increases prostaglandins even further. In addition, the stretching of the **cervix** by a full-term fetus in the head-down position is regarded as a stimulant to uterine contractions. Combined, these stimulate true labor.[13]

The First Stage of labor begins with uterine contractions that initially, may last about 30 seconds and be spaced 15 to 20 minutes

13. 28.4 Maternal Changes During Pregnancy, Labor, and Birth by Lindsay M. Biga, Sierra Dawson, Amy Harwell, Robin Hopkins, Joel Kaufmann, Mike LeMaster, Philip Matern, Katie Morrison-Graham, Devon Quick, and Jon Runyeon is licensed under CC BY-NC-SA 4.0

apart. These increase in duration and frequency to more than a minute in length and about 3 to 4 minutes apart. Typically, doctors advise that they be called when contractions are coming about every 5 minutes. Some women experience **false labor** or **Braxton-Hicks contractions**, especially with the first child. These may come and go. They tend to diminish when the mother begins walking around. Real labor pains tend to increase with walking. Labor may also be signaled by a bloody discharge being expelled from the cervix. In one out of 8 pregnancies, the **amniotic sac** or water in which the fetus is suspended may break before labor begins. In such cases, the physician may induce labor with the use of medication if it does not begin on its own in order to reduce the risk of infection. Normally this sac does not rupture until the later stages of labor.

The first stage of labor is typically the longest. During this stage the cervix or opening to the uterus dilates to 10 centimeters or just under 4 inches (See figure below). This may take around 12-16 hours for first children or about 6-9 hours for women who have previously given birth. Labor may also begin with a discharge of blood or amniotic fluid.[14]
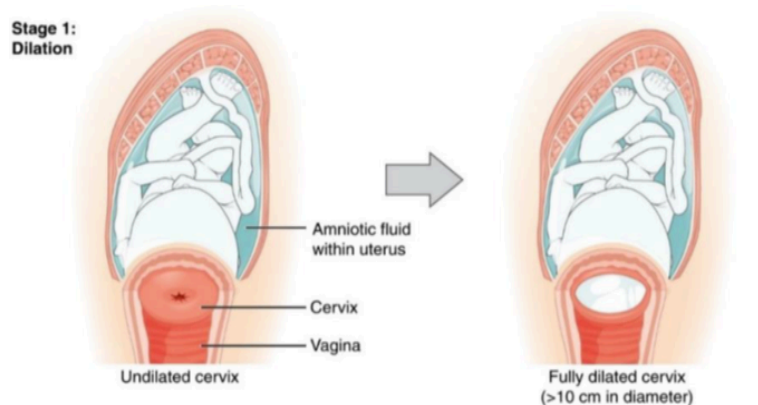
Stage 1: Dilation

Amniotic fluid within uterus

Cervix

Vagina

Undilated cervix

Fully dilated cervix (>10 cm in diameter)

14. Lifespan Development: A Psychological Perspective by Martha Lally and Suzanne Valentine-French is licensed under CC BY-NC-SA 3.0

Early cervical dilation[15]

The Second Stage

The passage of the baby through the birth canal is the **second stage of labor**. This stage takes about 10-40 minutes. Contractions usually come about every 2-3 minutes. The mother pushes and relaxes as directed by the medical staff. Normally the head is delivered first. The baby is then rotated so that one shoulder can come through and then the other shoulder. The rest of the baby quickly passes through. At this stage, an **episiotomy**, or incision made in the tissue between the vaginal opening and anus, may be performed to avoid tearing the tissue of the back of the vaginal opening (Mayo Clinic, 2016). The baby's mouth and nose are suctioned out. The umbilical cord is clamped and cut.[16]

15. Image by OpenStax is licensed under CC BY 3.0
16. Lifespan Development: A Psychological Perspective by Martha Lally and Suzanne Valentine-French is licensed under CC BY-NC-SA 3.0

Stage 2: Birth

① Presentation of head

② Rotation and delivery of anterior shoulder

③ Delivery of posterior shoulder

④ Delivery of lower body and umbilical cord

Full dilation and expulsion of the newborn[17]

The Third Stage

The **third of labor** is relatively painless. During this stage, the placenta or afterbirth is delivered. This is typically within 20 minutes after delivery. If an episiotomy was performed it is stitched up during this stage.[18]

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17. Image by OpenStax is licensed under CC BY 3.0
18. Lifespan Development: A Psychological Perspective by Martha Lally and Suzanne Valentine-French is licensed under CC BY-NC-SA 3.0

Stage 3:
Afterbirth
delivery
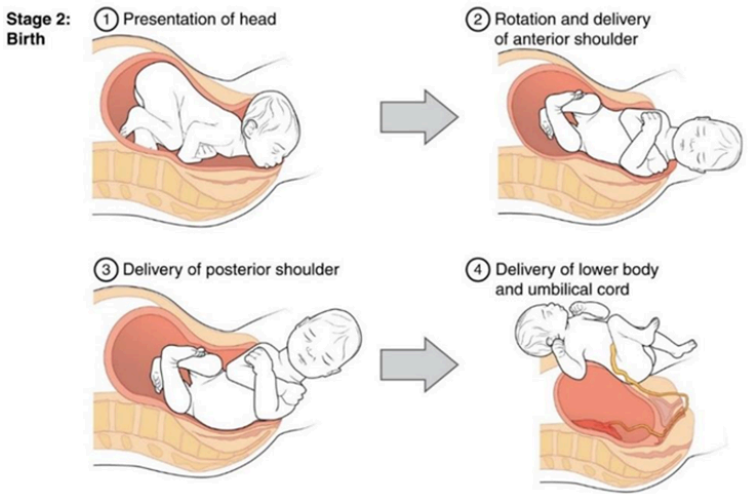
Placenta detaches
and exits through
vagina
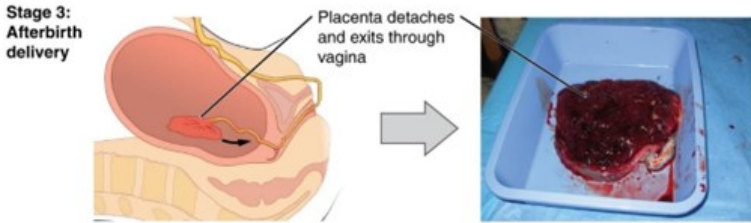
Delivery of the placenta and associated fetal
membranes[19]

Additional Considerations

More than 50% of women giving birth at hospitals use an **epidural anesthesia** during delivery (American Pregnancy Association, 2015). An **epidural block** is a **regional analgesic** that can be used during labor and alleviates most pain in the lower body without slowing labor. The epidural block can be used throughout labor and has little to no effect on the baby. Medication is injected into a small space outside the spinal cord in the lower back. It takes 10 to 20 minutes for the medication to take effect. An epidural block with stronger medications, such as anesthetics, can be used shortly before a

19. Image by OpenStax is licensed under CC BY 3.0

Cesarean Section or if a vaginal birth requires the use of **forceps** or **vacuum extraction**.[20]

Women giving birth can also receive other pain medications (although medications given through injection can have negative side effects on the baby). In emergency situations (such as the need for a C-section), women may be given **general anesthesia**. They can also choose not to utilize any pain medications. That is often referred to as **natural childbirth**.

Natural childbirth[21]

20. Lifespan Development: A Psychological Perspective (page 60) by Martha Lally and Suzanne Valentine-French is licensed under CC BY-NC-SA 3.0
21. Image by U.S. Army Alaska is licensed under CC BY 2.0

Women can also use alternate positions during labor and birth (including standing, squatting, being on hands and knees, and using a birthing stool), including delivering in tubs of warm water to help relieve the pain of childbirth.

Medical Interventions in Childbirth

Sometimes women cannot go into labor on their own and/or deliver vaginally. Let's look at induction of labor and Cesarean Sections.

Sometimes a baby's arrival may need to be induced before labor begins naturally. **Induction of labor** may be recommended for a variety of reasons when there is concern for the health of the mother or baby. For example:

- The mother is approaching two weeks beyond her due date and labor has not started naturally
- The mother's water has broken, but contractions have not begun
- There is an infection in the mother's uterus
- The baby has stopped growing at the expected pace
- There is not enough amniotic fluid surrounding the baby
- The placenta peels away, either partially or completely, from the inner wall of the uterus before delivery
- The mother has a medical condition that might put her or her baby at risk, such as high blood pressure or diabetes (Mayo Clinic, 2014).

Inducing Labor: There are both **pharmacological** and procedural methods in which labor can be induced. The most common is to intravenously administer a synthetic version of **oxytocin** called **Pitocin**. Once administered to the mom, the amount of Pitocin is adjusted based on whether or not contractions begin or become too

fast or strong. Both the mom's contractions and baby's heart rate are continuously monitored while Pitocin is being administered.

Pitocin will not be administered, however unless the condition of the cervix is found to be "favorable." The obstetrician will determine whether or not the cervix is ready by calculating a **Bishop Score**. There are five measures that are considered by one's obstetrician when calculating the Bishop Score, which include (1) cervical dilation in centimeters, (2) **cervical effacement** or a measure of how thin the cervix has become, (3) cervical consistency (firm or soft), (4) cervical position, and (5) station, or the position of the fetal head in relation to the **pelvic bones**.[22]

BISHOP SCORING

Score	Dilation (cm)	Effacement (%)	Cervical Consistency	Cervical Position	Station
0	Closed	0-30	Firm	Posterior	-3
1	1-2	40-50	Medium	Midposition	-2
2	3-4	60-70	Soft	Anterior	-1
3	>5	>80	—-	—-	1, 2

(1) Dilation is a measure of how open the cervix is. (2) Effacement revers to how thin the cervix is. The cervix is approximately three centimeters long and during labor will efface until it paper thin. (3) The consistency of the cervix is tough and resistant to stretching, but will become less rigid with each successive pregnancy. (4) The position of the cervix tends to become more

22. Maria Pagano licensed under CC BY SA 3.0

anterior (nearer the opening of the vagina) as labor becomes closer. (5) Fetal station describes the position of the fetus's head in relation to the distance from the ischial spines, which are approximately 3-4 centimeters inside the vagina and are not usually felt. Health professionals visualize where these spines are and use them as a reference point. Negative numbers indicate that the head is further inside than the ischial spines and positive numbers show that the head is below the level of the ischial spines."[23]

A Bishop Score of 8 or more indicates that labor will more than likely begin spontaneously, and if induction is needed, it most likely will be successful. A score between 6 and 7 cannot be used to make predictions regarding the success of labor or induction. A score of 5 or less is an indication that inducing labor may fail, and in this case the cervix may need to be "ripened."[24]

Cervical ripening (CR), often an initial component of labor induction, is the process of softening and effacing the cervix as well as stimulating early **cervical dilation**. Based on data from trials of labor induction, approximately 83 to 85 percent of women with an indication for induction require cervical ripening. Common CR methods include pharmacologic options, such as **prostaglandins** (misoprostol and Prostaglandin E2), and mechanical options, such as inflating a balloon **catheter** in the cervix.

While prostaglandins (vaginal or oral) and mechanical methods (e.g. **balloon catheters**) are the most commonly used methods of CR

23. Table and text adapted from Wikipedia and is licensed under CC BY SA 3.0
24. Text adapted from Wikipedia and is licensed under CC BY SA 3.0

in the inpatient setting, there is variation in the dose, regimen, or protocols applied. Some women's cervixes will rapidly respond to a CR intervention, while others require extended time with more than one intervention being tried if the first one fails.[25]

Amniotomy: Amniotomy, also known as artificial rupture of membranes (AROM) and by the lay description "breaking the water," is the intentional rupture of the amniotic sac by an obstetrical provider. This procedure is common during labor management and has been performed by obstetrical providers for at least a few hundred years. The reasons for the intentional rupture of the amniotic sac during labor are multifold and include, but are not limited to, influencing the speed of labor, allowing for more direct monitoring of fetal status, and qualitative assessment of the amniotic fluid.

Amniotomy is easily performed with the use of specially designed hooks intended to grab and tear the amniotic membrane. The two most used devices are (1) an approximately 10-inch rod with a hook on the end of the rod or (2) a finger cot with a hook on the end of the cot. With either device, the practitioner first assesses cervical dilation through the performance of a sterile digital exam. At the same time, assessment of the fetal presenting part is made, ensuring that the presenting part is, in fact, the fetal head and assessing that the fetal head is well engaged in the pelvis. After confirmation of both fetal presentation and engagement, the practitioner can proceed with artificial rupture of membranes.[26]

A **Cesarean Section** (C-section) is surgery to deliver the baby by

25. "Cervical Ripening in the Outpatient Setting" from Agency for Healthcare Research and Quality, U.S Department of Health and Human Services. No Author Attribution Found. Public Domain.
26. Mahdy H, Glowacki C, Eruo FU. Amniotomy. [Updated 2021 Feb 25]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2021 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK470167/ . Licensed under CC BY 4.0

being removed through the mother's abdomen. In the United States, about one in three women have their babies delivered this way (Martin et al., 2015). Most C-sections are done when problems occur during delivery unexpectedly. These can include:

- Health problems in the mother
- Signs of distress in the baby
- Not enough room for the baby to go through the vagina
- The position of the baby, such as a breech presentation where the head is not in the downward position.

A woman receiving a C-section.[27]
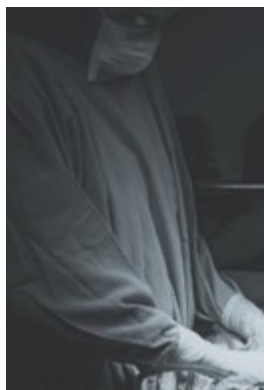
A baby being delivered by

C-sections are also more common among women carrying more than one baby. Although the surgery is relatively safe for mother and baby, it is considered major surgery and carries health risks. Additionally, it also takes longer to recover from a C-section than from vaginal birth. After healing, the incision may leave a weak spot in the wall of the uterus. This could cause problems with an attempted vaginal birth later. In the past, doctors were hesitant to

27. Image by Tammra M is licensed under CC BY 2.0
28. Image by Patricia Prudente on Unsplash

allow a vaginal birth after a C-section. However, now more than half of women who have a C-section go on to have a vaginal birth later.[29] This is referred to as a Vaginal Birth After Cesarean (VBAC).[30]

The Newborn

Assessing the Newborn

In the minutes following birth, a newborn must undergo dramatic systemic changes to be able to survive outside the womb. An obstetrician, midwife, or nurse can estimate how well a newborn is doing by obtaining an **APGAR score**. The Apgar score was introduced in 1952 by anesthesiologist Dr. Virginia Apgar as a method to assess the effects on the newborn of anesthesia given to the laboring mother. Healthcare providers now use it to assess the general wellbeing of the newborn, whether or not analgesics or anesthetics were used.

Five criteria are assessed:

- Skin color
- Heart rate
- Reflex,
- Muscle tone
- Respiration

29. Lifespan Development: A Psychological Perspective (page 61) by Martha Lally and Suzanne Valentine-French is licensed under CC BY-NC-SA 3.0
30. Children's Development by Ana R. Leon is licensed under CC BY 4.0

Each criterion is assigned a score of 0, 1, or 2. Scores are taken at 1 minute after birth and again at 5 minutes after birth. Each time that scores are taken, the five scores are added together. High scores (out of a possible 10) indicate the baby has made the transition from the womb well, whereas lower scores indicate that the baby may be in distress. The technique for determining an APGAR score is quick and easy, painless for the newborn, and does not require any instruments except for a stethoscope.

Of the five APGAR criteria, heart rate and respiration are the most critical. Poor scores for either of these measurements may indicate the need for immediate medical attention to resuscitate or stabilize the newborn. In general, any score lower than 7 at the 5-minute mark indicates that medical assistance may be needed. A total score below 5 indicates an emergency situation. Normally, a newborn will get an intermediate score of 1 for some of the APGAR criteria and will progress to a 2 by the 5-minute assessment. Scores of 8 or above are normal.[31]

The APGAR Assessment[32]

31. From Lumen Learning, Authored by: Florida State College at Jacksonville. License: CC BY 4.0
32. Image by Event Medicine Group

APGAR SCORE

SCORE	APPEARANCE	PULSE	GRIMACE	ACTIVITY	RESPIRATION
0	Blue all over	No pulse	No response to stimulation	No movement	No respiration
1	Blue extremities	<100 beats/min	Grimace on stimulation	Some flexion	Weak, irregular, slow
2	No blue colouration	>100 beats/min	Cry on stimulation	Flexed limbs that resist extension	Strong cry

≥7 NORMAL 4-6 LOW ≤3 CRITICAL

Another way to assess the condition of the newborn is by administering the **Neonatal Behavioral Assessment Scale (NBAS)** developed by Brazelton in the 70's. This Scale contains 28 behavioral and 18 reflex items, that assess the baby's capabilities across different developmental areas (autonomic, motor, state, and social-interactive systems) and describes how infants integrate these areas as they adapt to their new environment. At the time it was developed in the 70's the approach was considered innovative for recognizing that a baby is a highly developed organism, even when just newly born. Today, this tool has been used around the world to further assess the newborn, especially those with low Apgar scores, and to make comparisons of infants in different cultures (Brazelton & Nugent, 1995). [33]

In addition to the Apgar and the Neonatal Behavioral Assessment, newborns are also routinely screened for different conditions.

33. Lifespan Development: A Psychological Perspective by Martha Lally and Suzanne Valentine-French is licensed under CC BY-NC-SA 3.0

Within the first 24 to 48 hours after birth, babies born in hospitals undergo a simple **heel stick test**, where a few drops of blood are collected on a special paper card. Providers test those dried blood spots for a variety of different congenital disorders, or conditions that are present when the baby is born. In California, newborns are now screened for 80 different genetic and congenital disorders.

A medical professional performing the heel stick test.[34]

Newborns are also screened for hearing disorders and certain serious heart problems.[35]

34. Image by the U.S. Air Force is in the public domain
35. Newborn Screening is in the public domain ; Newborn Screening Program (NBS) by the California Department of Public Health is in the public domain

Appearance at Birth

During labor and birth, the infant's skull changes shape to fit through the birth canal, sometimes causing the child to be born with a misshapen or elongated head. It will usually return to normal on its own within a few days or weeks.

Some newborns have a fine, velvety body hair called **lanugo**. It may be particularly noticeable on the back, shoulders, forehead, ears and face of premature infants. Lanugo disappears within a few weeks. Likewise, not all infants are born with lush heads of hair. Some may be nearly bald while others may have very fine, almost invisible hair. Some babies are even born with a full head of hair. Amongst fair-skinned parents, this fine hair may be blond, even if the parents are not. The picture on the left shows lanugo on the shoulders of newborn twins.

Lanugo on the shoulder and back of twin girls.[36]

A newborn baby covered in ver

Immediately after birth, a newborn's skin is often grayish to dusky

36. Image is in the public domain
37. Image by Upsilon Andromedae is licensed under CC BY 2.0

blue in color. As soon as the newborn begins to breathe, usually within a minute or two, the skin's color returns to its normal tone. Newborns are wet, covered in streaks of blood, and coated with a white substance known as **vernix**, which is thought to act as an antibacterial barrier, seen in the picture on the right.

The scalp may also be temporarily bruised or swollen, especially in hairless newborns, and the area around the eyes may be puffy.[38]

The newborn may also have **Mongolian spots** (blue- or blue-black) birthmark on the lower back), various other birthmarks, or peeling skin, particularly on the wrists, hands, ankles, and feet. [39]

A newborn's genitals are enlarged and reddened, with male infants having an unusually large scrotum. The breasts may also be enlarged, even in male infants. This is caused by naturally occurring maternal hormones and is a temporary condition.

The umbilical cord of a newborn is bluish-white in color. After birth, the umbilical cord is normally cut, leaving a 1–2-inch stub. The umbilical stub will dry out, shrivel, darken, and spontaneously fall off within about 3 weeks. Occasionally, hospitals may apply triple dye to the umbilical stub to prevent infection, which may temporarily color the stub and surrounding skin purple.

38. Children's Development by Ana R. Leon is licensed under CC BY 4.0
39. Mongolian Spot by Wiktionary is licensed under CC BY-SA 3.0

The clamping and cutting of a newborn's umbilical cord. [40]

Newborns lose many of the above physical characteristics quickly. Thus older babies look very different. While older babies are considered "cute," newborns can be "unattractive" by the same criteria and first time parents may need to be educated in this regard. [41]

40. Image by NNethala is licensed under CC BY-SA 3.0
41. Infant by WikiDoc is licensed under CC BY-SA 3.0

Problems of the Newborn

Anoxia is a temporary lack of oxygen to the brain. Difficulty during delivery may lead to anoxia which can result in brain damage or in severe cases, death. Babies who suffer both low birth weight and anoxia are more likely to suffer learning disabilities later in life as well.

A child is considered **low birth weight** if he or she weighs less than 5 pounds 8 ounces (2500 grams). About 8.2 percent of babies born in the United States are of low birth weight (Center for Disease Control, 2015a). Sixty-seven percent of these babies are also preterm. A low birth weight baby has difficulty maintaining adequate body temperature because it lacks the fat that would otherwise provide insulation. Such a baby is also at more risk for infection. **Very low birth weight** babies (3 pounds, 4 ounces or less) have an increased risk of developing cerebral palsy. Many causes of low birth weight are preventable with proper prenatal care.

A newborn might also have a low birth weight if it is born at less than 37 weeks gestation, which qualifies it as a **preterm** baby (CDC, 2015c). Early birth can be triggered by anything that disrupts the mother's system. For instance, vaginal infections can lead to premature birth because such infection causes the mother to release **anti-inflammatory chemicals** which, in turn, can trigger contractions. Smoking and the use of other teratogens can lead to preterm birth. A significant consequence of preterm birth includes **respiratory distress syndrome**, which is characterized by weak and irregular breathing (see the image below). Premature babies often cannot yet regulate their own temperature or feed by nursing or bottle. They may struggle to regulate their heart rate effectively and may experience **jaundice**. They often require care in the **Neonatal**

Intensive Care Unit (NICU) until they are as healthy as a full-term baby.[42]

A premature baby on a "Continuous Positive Airway Pressure" (CPAP) in the Neonatal Intensive Care Unit (NICU).[43]

Infants that have birth weights that are below expectation based on their gestational age are referred to as **small-for-date**. These infants may be full term or preterm (see image below), but still weigh less than 90% of all babies of the same gestational age. This is a very serious situation for newborns as their growth was adversely

42. Lifespan Development: A Psychological Perspective (pages 62-63) by Martha Lally and Suzanne Valentine-French is licensed under CC BY-NC-SA 3.0; Stillbirth by Wikipedia by Wikipedia is licensed under CC BY-SA 3.0
43. Photo by Jennifer Paris used with permission

affected. Regev et al. (2003) found that small-for-date infants died at rates more than four times higher than other infants.
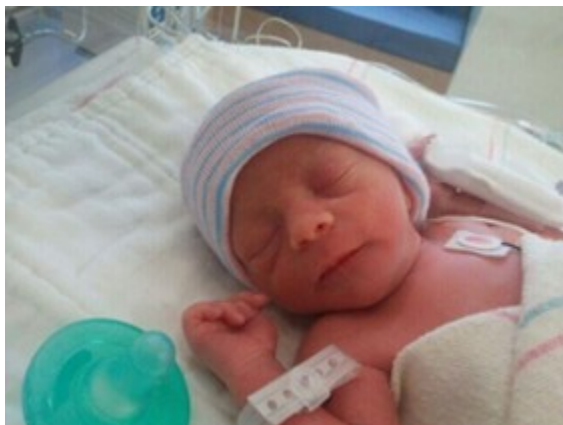
The baby above was born at 32 weeks and only weighed 2 pounds and 15 ounces.[44]

When babies are not born by 42 weeks gestation, or two weeks after their due date, they are considered overdue or **postmature**. There are some concerns about how long the placenta can function and most doctors will consider induction for overdue babies.

When a fetus (unborn baby) dies while still inside the mother (after 20-24 weeks gestation) or dies during delivery (childbirth),

44. Child Growth and Development: An Open Educational Resources Publication by College of the Canyons by Jennifer Paris, Antoinette Ricardo, and Dawn Richmond is licensed under CC BY 4.0

it is said that the delivered baby is **stillborn**. The causes of many stillbirths are unknown, even when special tests are done to learn the cause. Possible causes include nicotine, alcohol, or drugs taken by the mother during pregnancy, physical trauma, radiation poisoning, Rh disease, and umbilical cord problems. The number of stillbirths in the United States is about 1 in 115 births, which is about 26,000 a year, or one every 20 minutes.[45]

Breast Milk and Feeding

Breast milk is considered the ideal diet for newborns. It has the right amount of calories, fat, and protein to support overall physical and neurological development, provides a source of iron more easily absorbed in the body than the iron found in dietary supplements, provides a resistance against many diseases, is more easily digested by infants than is formula, and it helps babies make a transition to solid foods more easily than if bottle fed. For all these reasons, it is recommended that mothers breast feed their infants until at least 6 months of age and that breast milk be used in the diet throughout the first year (U.S. Department of Health and Human Services, 2004a in Berk, 2007). However, most mothers who breastfeed in the United States stop breast feeding at about 6-8 weeks, often to return to work outside the home. Mothers can certainly continue to provide breast milk to their babies by expressing and then freezing the milk to be bottle fed at a later time or by being available to their infants at feeding time. However, some mothers find that after the initial encouragement they receive in

45. Lifespan Development: A Psychological Perspective by Martha Lally and Suzanne Valentine-French is licensed under CC BY-NC-SA 3.0; Stillbirth by Wikipedia by Wikipedia is licensed under CC BY-SA 3.0

the hospital to breast feed, the outside world is less supportive of such efforts. Some workplaces support breastfeeding mothers by providing flexible schedules and welcoming infants, but many do not, and the public support of breastfeeding is sometimes lacking. Women in Canada are more likely to breastfeed than are those in the United States and the Canadian health recommendation is for breastfeeding to continue until 2 years of age. Facilities in public places in Canada such as malls, ferries, and workplaces provide more support and comfort for the breastfeeding mother and child than found in the United States.

One early argument given to promote the practice of breastfeeding was that it promoted bonding and healthy emotional development for infants. However, this does not seem to be the case. Breastfed and bottle-fed infants adjust equally well emotionally (Ferguson and Woodward, 1999). This is good news for mothers who may be unable to breastfeed for a variety of reasons and for fathers who might feel left out as a result.

In addition to the nutritional benefits of breastfeeding, breast milk is free! Anyone who has priced formula recently can appreciate this added incentive to breastfeeding. Prices for a month's worth of formula can easily range from $130-200. Breastfeeding also stimulates contractions in the uterus to help it regain its normal size. And women who breastfeed are more likely to space their pregnancies further apart.

Counter arguments of breastfeeding:

Although there is research that promotes breastfeeding there are also those who challenge the belief that breast milk is free. For breastmilk to be completely beneficial for infants the mother's life choices will ultimately affect the quality of the nutrition an infant will receive. Let's consider the nutritional intake of the mother. Breastfeeding will both limit some food and drink choices as well as necessitate an increased intake of healthier options. A simple trip down the supermarket aisles will show you that nutritious and healthier options can be more expensive than some of the cheaper more processed options. A large variety of vegetable and fruits must

be consumed, accompanied by the right proportions and portions of the whole grains, dairy products, and fat food groups. Additionally, it is also encouraged for breastfeeding mothers take vitamins regularly. That raises the question of how free breastfeeding truly is.

A *historic look at breastfeeding*:

The use of **wet nurses**, or lactating women hired to nurse others' infants, during the middle ages eventually declined and mothers increasingly breastfed their own infants in the late 1800s. In the early part of the 20th century, breastfeeding began to go through another decline and by the 1950s, it was practiced less frequently by middle class, more affluent mothers as formula began to be viewed as superior to breast milk. In the late 1960s and 1970s, greater emphasis began to be placed on natural childbirth and breastfeeding and the benefits of breastfeeding were more widely publicized. Gradually rates of breastfeeding began to climb, particularly among middle-class educated mothers who received the strongest messages to breastfeed. Today, women receive consultation from lactation specialists before being discharged from the hospital to ensure that they are informed of the benefits of breastfeeding and given support and encouragement to get their infants to get used to taking the breast. This does not always happen immediately and first-time mothers, especially, can become upset or discouraged. In this case, lactation specialists and nursing staff can encourage the mother to keep trying until baby and mother are comfortable with the feeding.

Global Considerations and Malnutrition

In the 1960s, formula companies led campaigns in developing countries to encourage mothers to feed their babies on infant formula. Many mothers felt that formula would be superior to breast milk and began using formula. The use of formula can certainly be healthy under conditions in which there is adequate, clean water

with which to mix the formula and adequate means to sanitize bottles and nipples. However, in many of these countries such conditions were not available, and babies often were given diluted, contaminated formula which made them become sick with diarrhea and become dehydrated. Rates of breast feeding declined in Peru from 90 percent to 10 percent in just 8 years' time (Berger, 2001). These conditions continue today and now many hospitals prohibit the distribution of formula samples to new mothers in efforts to get them to rely on breast feeding. Many of these mothers do not understand the benefits of breast feeding and need to be encouraged and supported to promote this practice. Breast feeding could save the lives of millions of infants each year, according to the World Health Organization, yet fewer than 40 percent of infants are breastfed exclusively for the first 6 months of life.

Most women can breastfeed unless they are receiving chemotherapy or radiation therapy, have HIV, are dependent on illicit drugs, or have active, untreated tuberculosis.

Children in developing countries and countries experiencing the harsh conditions of war are at risk for two major types of **malnutrition**. **Infantile marasmus** refers to starvation due to a lack of calories and protein. Children who do not receive adequate nutrition lose fat and muscle until their bodies can no longer function. Babies who are breast fed are much less at risk of malnutrition than those who are bottle fed. After **weaning**, children who have diets deficient in protein may experience **kwashiorkor** or the "disease of the displaced child" often occurring after another child has been born and taken over breastfeeding. This results in a loss of appetite and swelling of the abdomen as the body begins to break down the vital organs as a source of protein.

The Breast Milk Industry: The benefits of breast milk are well-known and publicized. The collection and distribution of breast milk has become a million-dollar industry supplying hospitals and others in need of the ideal diet. For more information, go to www.prolacta.com to see a current development in the story of breast milk.

Milk Anemia in the United States: About 9 million children in the United States are malnourished (Children's Welfare, 1998). More still suffer from milk anemia, a condition in which milk consumption leads to a lack of iron in the diet. This can be due to the practice of giving toddlers milk as a pacifier-when resting, when riding, when waking, and so on. Appetite declines somewhat during toddlerhood and a small amount of milk (especially with added chocolate syrup) can easily satisfy a child's appetite for many hours. The calcium in milk interferes with the absorption of iron in the diet as well. Many preschools and daycare centers give toddlers a drink after they have finished their meal in order to prevent spoiling their appetites.[46]

Infant Sleep

A newborn typically sleeps approximately 16.5 hours per 24-hour period. This is usually **polyphasic sleep** in that the infant is accumulating the 16.5 hours over several sleep periods throughout the day (Salkind, 2005). The infant is averaging 15 hours per 24-hour period by one month, and 14 hours by 6 months. By the time children turn two, they are averaging closer to 10 hours per 24 hours. Additionally, the average newborn will spend close to 50% of the sleep time in the **rapid eye movement** (REM) phase, which decreases to 25% to 30% in childhood.

Sudden Unexpected Infant Deaths (SUID): Each year in the United States, there are about 3,500 Sudden Unexpected Infant Deaths (SUID). These deaths occur among infants less than one-year-old and have no immediately obvious cause (CDC, 2019). The three commonly reported types of SUID are:

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1. **Sudden Infant Death Syndrome** (SIDS): SIDS *is identified when the death of a healthy infant occurs suddenly and unexpectedly, and medical and forensic investigation findings (including an autopsy) are inconclusive.* SIDS is the leading cause of death in infants 1 to 12 months old, and approximately 1,400 infants died of SIDS in 2017 (CDC, 2019). Because SIDS is diagnosed when no other cause of death can be determined, possible causes of SIDS are regularly researched. One leading hypothesis suggests that infants who die from SIDS have abnormalities in the area of the brainstem responsible for regulating breathing (Weekes-Shackelford & Shackelford, 2005).

2. Unknown Cause: The sudden death of an infant less than one year of age that cannot be explained because a thorough investigation was not conducted, and cause of death could not be determined. In 2017, 1300 infants died from unknown causes (CDC, 2019).

3. **Accidental Suffocation and Strangulation in Bed**: Reasons for accidental suffocation include: Suffocation by soft bedding, another person rolling on top of or against the infant while sleeping, an infant being wedged between two objects such as a mattress and wall, and strangulation such as when an infant's head and neck become caught between crib railings. In 2017, 900 infants died from accidental suffocation and strangulation. The 2017 percentages of infants who died based on each of the three types are listed in the pie chart below.[47]

47. Lifespan Development: A Psychological Perspective 2nd Edition by Martha Lally and Suzanne Valentine-French is licensed under CC BY-NC-SA 3.0[48] Materials developed by Centers for Disease Control and Prevention, *National Vital Statistics System, Compressed Mortality File.* Use of this material, including any links to the materials on the CDC,ATSDR or HHS websites, does not imply endorsement by CDC, ATSDR, HHS or the United States Government.

Breakdown of Sudden Unexpected Infant Death by Cause, 2017

26%

38%

36%

- Sudden infant death syndrome (SIDS)
- Unknown cause
- Accidental suffocation and strangulation in bed
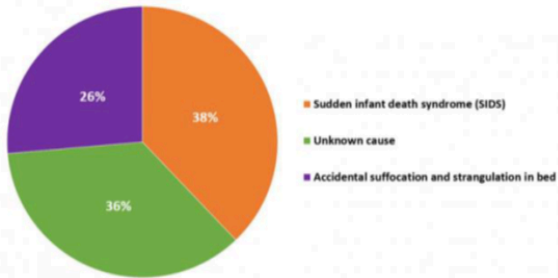
SOURCE: CDC/NCHS, National Vital Statistics System, Compressed Mortality File

This chart shows the breakdown of sudden unexpected infant deaths by cause in 2017. 38% of cases were categorized as sudden infant death syndrome, followed by unknown cause (36%), and accidental suffocation and strangulation in bed (26%).

[48]

As can be seen in the following line graph, the combined SUID death rate declined considerably following the release of the American Academy of Pediatrics safe sleep recommendations in 1992, which advocated that infants be placed for sleep on their backs (nonprone position). These recommendations were followed by a major Back to Sleep Campaign in 1994. However, accidental suffocation and strangulation in bed mortality rates remained unchanged until the late 1990s. In 1998 death rates from accidental suffocation and strangulation in bed actually started to increase, and they reached the highest rate at 24.6 deaths per 100,000 live births in 2017 (CDC, 2019).

Trends in Sudden Unexpected Infant Death by Cause, 1990-2017
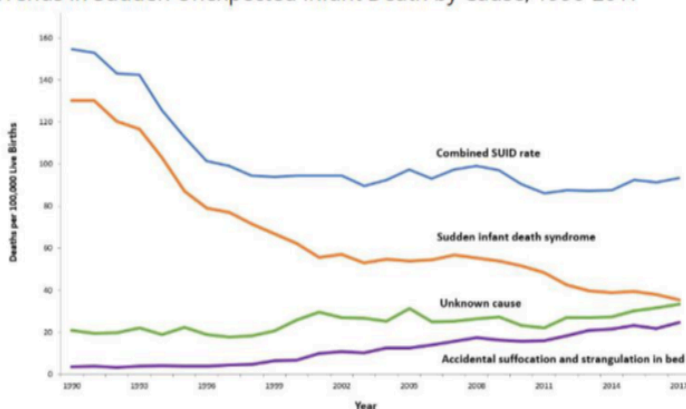
SOURCE: CDC/NCHS, National Vital Statistics System, Compressed Mortality File
This graph shows the trends in sudden unexpected infant death (SUID) rates in the United States from 1990 through 2017.

48

Should infants be sharing the bed with parents? Colvin, Collie-Akers, Schunn and Moon (2014) analyzed a total of 8207 deaths from 24 states during 2004–2012 that were contained in the National Center for the Review and Prevention of Child Deaths Case Reporting System, a database of death reports from state child death review teams. The results indicated that younger victims (0-3 months) were more likely to die by bed-sharing and sleeping in an adult bed/on a person. A higher percentage of older victims (4 months to 364 days) rolled into objects in the sleep environment and changed position from side/back to prone. Carpenter et al.

48. Materials developed by Centers for Disease Control and Prevention, *National Vital Statistics System, Compressed Mortality File.* Use of this material, including any links to the materials on the CDC,ATSDR or HHS websites, does not imply endorsement by CDC, ATSDR, HHS or the United States Government.

(2013) compared infants who died of SIDS with a matched control and found that infants younger than three months old who slept in bed with a parent were five times more likely to die of SIDS compared to babies who slept separately from the parents but were still in the same room. They concluded that bed sharing, even when the parents do not smoke or take alcohol or drugs, increases the risk of SIDS. However, when combined with parental smoking and maternal alcohol consumption and/or drug use, risks associated with bed sharing greatly increased.

The two studies discussed above were based on American statistics. What about the rest of the world? Co-sleeping occurs in many cultures, primarily because of a more collectivist perspective that encourages a close parent-child bond and interdependent relationship (Morelli, Rogoff, Oppenheim, & Goldsmith, 1992). In countries where co-sleeping is common, however, 77% of parents and infants typically sleep on floor mats and other hard surfaces which minimize the suffocation that can occur with bedding (Nelson, Schiefenhoevel, & Haimerl, 2000).[49]

Postpartum Maternal Concerns

After pregnancy many women experience emotional changes. The **baby blues** are often mentioned as a common occurrence in new mothers. The baby blues are feelings of sadness that occur 3 to 5 days after having a baby, and typically disappear usually within 10 days of the birth. New mothers may have trouble sleeping, be moody, and feel let-down from the birthing experience. However, postpartum depression is not the same as the baby blues. According to the Diagnostic and Statistical Manual of Mental Disorders-5th edition (DSM-5), (American Psychiatric Association, 2013),

49. Lifespan Development: A Psychological Perspective 2nd Edition by Martha Lally and Suzanne Valentine-French is licensed under CC BY-NC-SA 3.0[51] Lifespan Development: A Psychological Perspective by Martha Lally and Suzanne Valentine-French is licensed under CC BY-NC-SA 3.0

peripartum onset of depression, also known as **postpartum depression**, is a type of depression that occurs during pregnancy or in the 4 weeks following pregnancy. Approximately 1 out of 8 women experience postpartum depression and symptoms can include feelings of sadness, sleeplessness, and difficulty bonding with the newborn.

Changing hormone levels are thought to be a factor in the occurrence of **peripartum depression**, however, risk factors include having depression previously, a family history of depression, being younger than 20, experiencing stress, and substance use. **Peripartum-onset mood disorders**, both depression and mania, can present with or without psychotic features. Hallucinations and delusions are associated with **postpartum psychotic episodes** and have included command hallucinations to kill the infant or delusions that the infant is possessed. Psychotic features occur in approximately 1 in 500 to 1 in 1,000 deliveries, and the risk is higher for women with prior postpartum mood episodes (American Psychiatric Association, 2013).

Postpartum anxiety is also a concern for many new mothers. According to Bregel (2017) because oxytocin, a bonding hormone, rises during pregnancy, brain areas related to empathy and anxiety are heightened. Consequently, the new mother is "hard-wired" to respond to and fend for her baby, which can lead to toxic levels of stress and anxiety. These can manifest as heightened alertness, intrusive and horrifying thoughts of something terrible happening to the infant, and physiological arousal. Just as for peripartum depression and postpartum psychosis, a new mother experiencing postpartum anxiety should seek assistance from a health care provider.[51]

6. Brain and Body Development

From Reflexes to Voluntary Movements

Reflexes

Reflexes are involuntary movements or actions. Some movements are spontaneous and occur as part of the baby's normal activity,

while other movements are responses to certain actions. Healthcare providers will often check reflexes to determine if the brain and nervous system are working well. While some reflexes occur only in specific periods of development, other reflexes will remain and change during the course of development. The following are some of the normal reflexes seen in newborn babies:[1]

- **Rooting reflex** – This reflex starts when the corner of the baby's mouth is stroked or touched. The baby will turn his or her head and open his or her mouth to follow and root in the direction of the stroking. This helps the baby find the breast or bottle to start feeding. This reflex lasts about 4 months. [2]
- **Sucking reflex**– Rooting helps the baby get ready to suck. When the roof of the baby's mouth is touched, the baby will start to suck. This reflex doesn't start until about the 32nd week of pregnancy and is not fully developed until about 36 weeks. Premature babies may have a weak or immature sucking ability because of this. Because babies also have a hand-to-mouth reflex that goes with rooting and sucking, they may suck on their fingers or hands. [3]
- **Moro reflex** – The Moro reflex is often called a startle reflex. That's because it usually occurs when a baby is startled by a loud sound or movement. In response to the sound, the baby throws back his or her head, extends out his or her arms and legs, cries, then pulls the arms and legs back in. A baby's own cry can startle him or her and trigger this reflex. This reflex lasts until the baby is about 2 months old. [4]

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2. Used under permission as stated Stanford Children's Health, Lucile Packard Children's Hospital Stanford
3. Used under permission as stated Stanford Children's Health, Lucile Packard Children's Hospital Stanford

- **Stepping reflex** – The stepping reflex prepares the baby to start walking independently. When the baby is held under the arms with their bare feet touching the ground, the newborn will make "stepping" movements with his or her legs. This generally disappears around the age of 2 months. [5]
- **Babinski reflex** – The function of the Babinski reflex is unknown, although it may have to do with walking. After stroking the bottom of the baby's foot from toe to heel, the baby's toes fan out and the foot pulls up and away toward the shin. This can last up until the end of the first year of life, though it often disappears around 8-9 months. At this point the reflex changes, and the toes curl down and the foot curls in response to the same stimulation. If the earlier Babinski reflex is found in an adult, it can indicate some form of brain damage. [6]
- **Grasping reflex** – Stroking the palm of a baby's hand causes the baby to close his or her fingers in a grasp. The grasp reflex lasts until the baby is about 5 to 6 months old. A similar reflex in the toes lasts until 9 to 12 months. [7]

Brain Development

Some of the most dramatic physical change that occurs after birth

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6. Boundless Psychology is licensed under CC BY SA 4.0
7. Used under permission as stated Stanford Children's Health, Lucile Packard Children's Hospital Stanford

is in the brain. We are born with most of the brain cells that we will ever have; that is, about 100 billion **neurons** whose function is to store and transmit information. While most of the brain's neurons are present at birth, they are not fully mature. During the next several years **dendrites**, or branching extensions that collect information from other neurons, will undergo a period of exuberance. Because of this proliferation of dendrites, by age two a single neuron might have thousands of dendrites. **Synaptogenesis**, or the formation of connections between neurons, continues from the prenatal period forming thousands of new connections during infancy and toddlerhood. This period of rapid neural growth is referred to as **synaptic blooming**.

The blooming period of neural growth is then followed by a period of **synaptic pruning**, where neural connections are reduced thereby making those that are used much stronger. It is thought that pruning causes the brain to function more efficiently, allowing for mastery of more complex skills (Kolb & Whishaw, 2011). Experience will shape which of these connections are maintained and which of these are lost. Ultimately, about 40 percent of these connections will be lost (Webb, Monk, and Nelson, 2001). Blooming occurs during the first few years of life, and pruning continues through childhood and into adolescence in various areas of the brain.

Another major change occurring in the central nervous system is the development of myelin, *a coating of fatty tissues around the axon of the neuron* (Carlson, 2014). Myelin helps insulate the nerve cell and speed the rate of transmission of impulses from one cell to another. This enhances the building of neural pathways and improves coordination and control of movement and thought processes. The development of myelin continues into adolescence but is most dramatic during the first several years of life.

| Newborn | 1 Month | 9 Months | 2 Years | Adult |
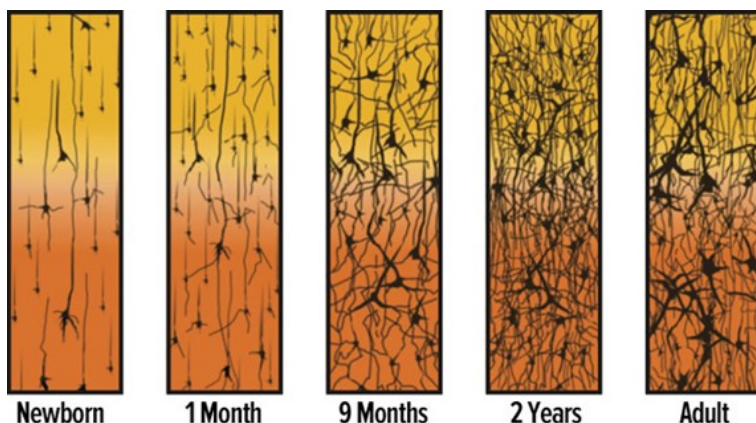
The development of brain synapses[8]

The infant brain grows very fast. At birth the brain is about 250 grams (half a pound) and by one year it is already 750 grams (Eliot, 1999). Comparing to adult size, the newborn brain is approximately 33% of adult size at birth, and in just 90 days, it is already at 55% of adult size (Holland et al., 2014). Most of the neural activity is occurring in the **cortex** or the thin outer covering of the brain involved in voluntary activity and thinking. The cortex is divided into two hemispheres (**left hemisphere** and **right hemisphere**), and each hemisphere is divided into four lobes, each separated by folds known as **fissures**. If we look at the cortex starting at the front of the brain and moving over the top (see Figure 3.3), we see first the

8. Adapted from Corel, JL. The postnatal development of the human cerebral cortex. Cambridge, MA: Harvard University Press;1975

frontal lobe (behind the forehead), which is responsible primarily for thinking, planning, memory, and judgment. Following the frontal lobe is the **parietal lobe**, which extends from the middle to the back of the skull and which is responsible primarily for processing information about touch. Next is the **occipital lobe**, at the very back of the skull, which processes visual information. Finally, in front of the occipital lobe, between the ears, is the **temporal lobe**, which is responsible for hearing and language (Jarrett, 2015).[9]
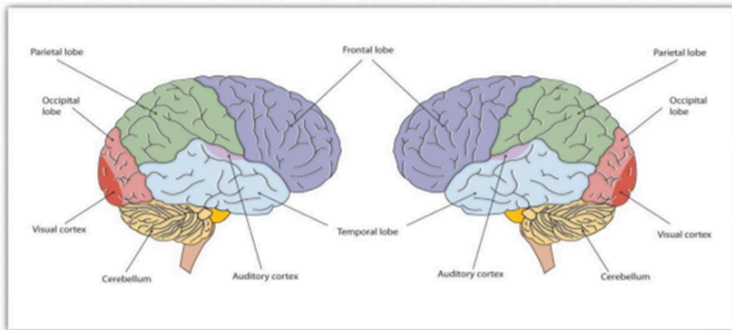
The brain is divided into two hemispheres (left and right), each of which has four lobes (temporal, frontal, occipital, and parietal). Furthermore, there are specific cortical areas that control different processes.[10]

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10. Image by Martha Lally and Suzanne Valentine-French is licensed under CC BY-NC-SA 3.0

MRI scans of human brain development
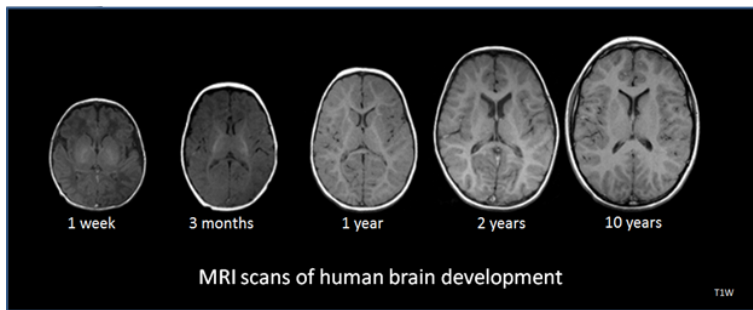
MRI scans of the human brain[11]

Although the brain grows rapidly during infancy, specific brain regions do not mature at the same rate. **Primary motor areas** develop earlier than **primary sensory areas**, and the **prefrontal cortex**, that is located behind the forehead, is the least developed (Giedd,2015). As the prefrontal cortex matures, the child is increasingly able to regulate or control emotions, to plan activities, strategize, and have better judgment. This is not fully accomplished in infancy and toddlerhood but continues throughout childhood.

Neuroplasticity refers to the brain's ability to change, both physically and chemically, to enhance its adaptability to environmental change and compensate for injury. The control of some specific bodily functions, such as movement, vision, and hearing, is performed in specified areas of the cortex, and if these areas are damaged, the individual will likely lose the ability to perform the corresponding function. The brain's neurons have a

11. Image is in the public domain

remarkable capacity to reorganize and extend themselves to carry out these particular functions in response to the needs of the organism, and to repair any damage. As a result, the brain constantly creates new neural communication routes and rewires existing ones. Both environmental experiences, such as stimulation and events within a person's body, such as hormones and genes, affect the brain's plasticity. So too does age. Adult brains demonstrate neuroplasticity, but they are influenced less extensively than those of infants (Kolb & Fantie, 1989; Kolb & Whishaw, 2011). [12]

The brain is about 75 percent its adult weight by three years of age. By age 6, it is at 95 percent its adult weight (Lenroot & Giedd, 2006). Myelination and the development of dendrites continue to occur in the cortex and as it does, we see a corresponding change in what the child is capable of doing. Greater development in the prefrontal cortex, the area of the brain behind the forehead that helps us to think, strategize, and control attention and emotion, makes it increasingly possible to inhibit emotional outbursts and understand how to play games. Understanding the game, thinking ahead, and coordinating movement improve with practice and myelination.

Growth in the Hemispheres and Corpus Callosum: Between ages 3 and 6, the left hemisphere of the brain grows dramatically. This side of the brain or hemisphere is typically involved in language skills. The right hemisphere continues to grow throughout early childhood and is involved in tasks that require spatial skills, such as recognizing shapes and patterns. The **corpus callosum**, a dense band of fibers that connects the two hemispheres of the brain, contains approximately 200 million nerve fibers that connect the

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hemispheres (Kolb & Whishaw, 2011). The corpus callosum is illustrated below.[13]

Corpus Callosum[14]
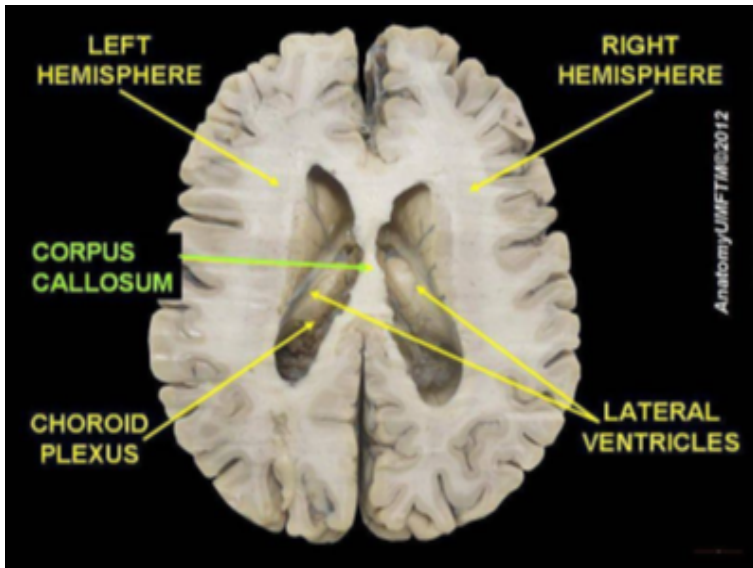
The corpus callosum is located a couple of inches below the **longitudinal fissure**, which runs the length of the brain and separates the two cerebral hemispheres (Garrett, 2015). Because the two hemispheres carry out different functions, they communicate with each other and integrate their activities through the corpus callosum. Additionally, because incoming information is directed toward one hemisphere, such as visual information from the left eye

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14. Image from Wikimedia is licensed under CC BY SA 3.0

being directed to the right hemisphere, the corpus callosum shares this information with the other hemisphere.

The corpus callosum undergoes a growth spurt between ages 3 and 6, and this results in improved coordination between right and left hemisphere tasks. For example, in comparison to other individuals, children younger than 6 demonstrate difficulty coordinating an Etch A Sketch toy because their corpus callosum is not developed enough to integrate the movements of both hands (Kalat, 2016).

Two major brain growth spurts occur during middle/late childhood (Spreen, Riser, & Edgell, 1995). Between ages 6 and 8, significant improvements in fine motor skills and eye-hand coordination are noted. Then between 10 and 12 years of age, the frontal lobes become more developed and improvements in logic, planning, and memory are evident (van der Molen & Molenaar, 1994). Myelination is one factor responsible for these growths. From age 6 to 12, the nerve cells in the association areas of the brain, that is those areas where sensory, motor, and intellectual functioning connect, become almost completely myelinated (Johnson, 2005). This myelination contributes to increases in information processing speed and the child's reaction time. The **hippocampus**, responsible for transferring information from the short-term to long-term memory, also show increases in myelination resulting in improvements in memory functioning (Rolls, 2000). Children in middle to late childhood are also better able to plan, coordinate activity using both left and right hemispheres of the brain, and to control emotional outbursts. Paying attention is also improved as the prefrontal cortex matures (Markant & Thomas, 2013).[15]

Changes in the brain between ages 6 and 8 also allow children to understand what others think of them and how to deal socially

15. Lifespan Development: A Psychological Perspective 2nd Edition by Martha Lally and Suzanne Valentine-French is licensed under CC BY-NC-SA 3.0

with the positive and negative consequences of that. Within this development period, children may struggle with mental health disorders or other health problems. As children are growing and becoming more capable, adults need to remember that children don't grow in isolation. The development of their bodies isn't separate from the changes that are occurring socially, emotionally, and cognitively. Awareness and understanding of their other developmental domains and needs will support the child during these changes.[16]

Development of the Sensory Systems

Throughout much of history, the newborn was considered a passive, disorganized being who possessed minimal abilities. However, current research techniques have demonstrated just how developed the newborn is with especially organized sensory and perceptual abilities.

Vision

The womb is a dark environment void of visual stimulation. Consequently, vision is one of the most poorly developed senses at birth, and time is needed to build those neural pathways between the eyes and the brain (American Optometric Association [AOA], 2019). Newborns typically cannot see further than 8 to 10 inches away from their faces (AOA, 2019). An 8-week old's vision is 20/300. This means an object 20 feet away from an infant has the same

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16. Children's Development by Ana R. Leon is licensed under CC BY 4.0 (modified by Dawn Rymond and Maria Pagano);

clarity as an object 300 feet away from an adult with normal vision. By 3-months visual acuity has sharpened to 20/200, which would allow them the see the letter E at the top of a standard eye chart (Hamer, 2016). As a result, the world looks blurry to young infants (Johnson & deHaan, 2015).

Why is visual acuity so poor in the infant? The **fovea**, which is the central field of vision in the **retina** and allows us to see sharp detail, is not fully developed at birth, and does not start to reach adult levels of development until 15 months (Li & Ding, 2017). Even by 45 months some of the sensory neurons (**cones**) of the fovea are still not fully grown. Can babies see color? Young infants can perceive color, but the colors need to be very pure forms of basic colors, such as vivid red or green rather than weaker pastel shades. Most studies report that babies can see the full spectrum of colors by five months of age (AOA, 2019).

Newborn infants prefer and orient to face-like stimuli more than they do other patterned stimuli (Farroni et al., 2005). They also prefer images of faces that are upright and not scrambled (Chien, 2011). Infants also quickly learn to distinguish the face of their mother from faces of other women (Bartrip, Morton, & De Schonen, 2001). When viewing a person's face, one-month old's fixate on the outer edges of the face rather than the eyes, nose, or mouth, and two-month old's gaze more at the inner features, especially the eyes (Hainline, 1978).

Researchers have examined the development of attention and tracking in the visual system and have found the following for young infants:

- One-month-olds have difficulty disengaging their attention and can spend several minutes fixedly gazing at a stimulus (Johnson & deHaan, 2015).
- Aslin (1981) found that when tracking an object visually, the eye movements of newborns and one-month old's are not smooth but **saccadic,** that is step-like jerky movements. Aslin also found their eye movements lag behind the object's motion.

This means young infants do not anticipate the trajectory of the object. By two months of age, their eye movements are becoming smoother, but they still lag behind the motion of the object and will not achieve this until about three to four months of age (Johnson & deHaan, 2015).

- Newborns also orient more to the visual field toward the side of the head, than to the visual field on either side of the nose (Lewis, Maurer, & Milewski, 1979). By two to three months, stimuli in both fields are now equally attended to (Johnson & deHaan, 2015).

Binocular vision, which requires input from both eyes, is evident around the third month and continues to develop during the first six months (Atkinson & Braddick, 2003). By six months infants can perceive **depth perception** in pictures as well (Sen, Yonas, & Knill, 2001). Infants who have experience crawling and exploring will pay greater attention to visual cues of depth and modify their actions accordingly (Berk, 2007).[17]

One of the first studies to investigate whether human infants could detect depth was conducted by Eleanor J. Gibson and Richard D. Walk in 1960. To test the ability to use depth, Gibson and Walk created an apparatus they called the **Visual Cliff**. This apparatus consisted of a 'bridge' either side of which was a sturdy glass platform. One side of this had a checkered pattern immediately under the glass (the 'shallow side'). On the other side of the bridge was a 'cliff' – the checkered pattern was beneath a vertical drop.[18]

17. Lifespan Development: A Psychological Perspective 2nd Edition by Martha Lally and Suzanne Valentine-French is licensed under CC BY-NC-SA 3.0
18. Russel, J. (2020, July 27). *Visual cliff experiment*. Simply Psychology. Licensed under CC BY NC ND 3.0
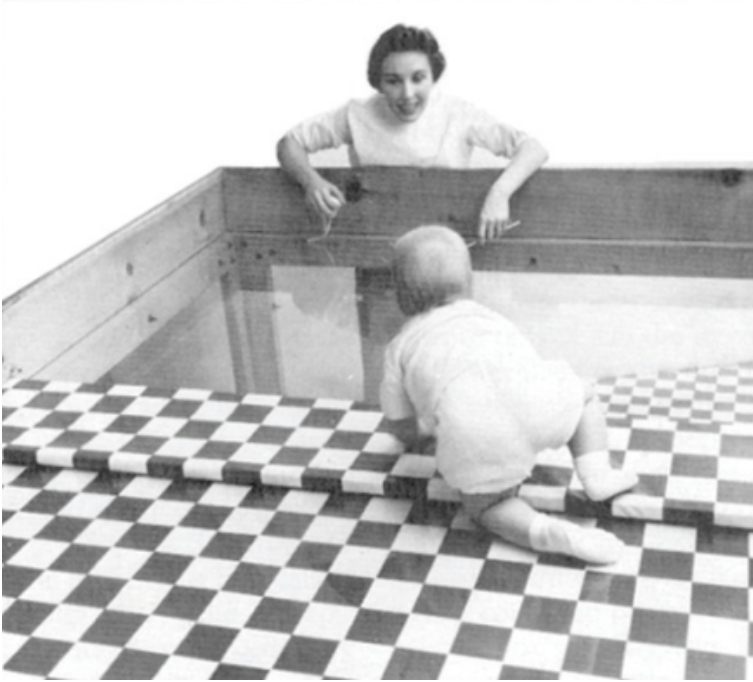
> This mother is encouraging her child to crawl across the visual cliff. The child hesitates to move forward as they see the transparent surface.[19]

Gibson and Walk hypothesized that if the child had developed depth perception then they would perceive the "cliff" side of the apparatus as a drop-off and would not cross, even if their Mom was on the

19. Image and text from NIH Visual Cliff Experiment from Wikimedia Commons. Licensed under CC BY SA 4.0

other side encouraging them to do so. Thirty-six infants between the ages of six to fourteen months were initially tested and the results showed that while 75% of the infants crawled to the Mom on the shallow side of the cliff, 92% of the babies refused to cross over to the "cliff" side.[20]

Vision Screening for Infants and Children

A vision screening, also called an eye test, is a brief exam that looks for potential vision problems and eye disorders. Vision screenings are often done by primary care providers as part of a child's regular checkup. Sometimes screenings are given to children by school nurses.

Vision screening is not used to diagnose vision problems. If a problem is found on a vision screening, your child's provider will refer you to an eye care specialist for diagnosis and treatment. This specialist will do a more thorough eye test. Many vision problems and disorders can be successfully treated with corrective lenses, minor surgery, or other therapies.

Vision screening is most often used to check for possible vision problems in children. The most common eye disorders in children include:[21]

1. **Strabismus**: Six different muscles surround each eye and work "as a team." This allows both eyes to focus on the same object. In someone with strabismus, these muscles do not work together. As a result, one eye looks at one object, while the other eye turns in a different direction and looks at another object. When this occurs, two different images are sent to the brain — one from each eye and this confuses the brain. In

20. Maria Pagano
21. Source: MedlinePlus, National Library of Medicine

children, the brain may learn to ignore (suppress) the image from the weaker eye.

If the strabismus is not treated, the eye that the brain ignores will never see well. This loss of vision is called **amblyopia.** Another name for amblyopia is **lazy eye**. Sometimes lazy eye is present first, and it causes strabismus.[22]

Infant with strabismus[23]

In most children with strabismus, the cause is unknown. In more than one half of these cases, the problem is present at or shortly after birth. This is called congenital strabismus.

22. Source MedlinePlus, National Library of Medicine
23. Image from MedlinePlus, National Library of Medicine

1. **Amblyopia**, also known as **lazy eye**. Children with amblyopia have blurry or reduced vision in one eye.[24] Treatment for amblyopia forces the child to use the eye with weaker vision. There are two common ways to do this. One is to have the child wear a patch over the good eye for several hours each day, over a number of weeks to months. The other is with eye drops that temporarily blur vision. Each day, the child gets a drop of a drug called **atropine** in the stronger eye. It is also sometimes necessary to treat the underlying cause. This could include glasses or surgery.[25]

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24. Source: MedlinePlus, National Library of Medicine
25. Source: MedlinePlus, National Library of Medicine

Both amblyopia and strabismus can be easily treated when found early.

   Vision screening is also used to help find the following vision problems, which affect both children and adults:

1. **Nearsightedness** (**myopia**), a condition that makes far away things look blurry
2. **Farsightedness** (**hyperopia**), a condition that makes close-up things look blurry
3. **Astigmatism**, a condition that makes both close-up and far-away things look blurry

A routine vision screening is not recommended for most healthy adults. But most adults are encouraged to get eye exams from an eye care specialist on a regular basis. However, children should be screened on a regular basis. The American Academy of Ophthalmology and the American Academy of Pediatrics (AAP) recommend the following vision screening schedule:

- Newborns: All new babies should be checked for eye infections or other disorders.
- 6 months: Eyes and vision should be checked during a regular well-baby visit.
- 1–4 years: Eyes and vision should be checked during routine visits.
- 5 years and older: Eyes and vision should be checked every year

26. Source: MedlinePlus, National Library of Medicine

Parents may need to get your child screened if he or she has symptoms of an eye disorder. For infants three months or older, symptoms include:

- Not being able to make steady eye contact
- Eyes that don't look properly aligned

For older children, symptoms include:

- Eyes that don't look properly lined up
- Squinting
- Closing or covering one eye
- Trouble reading and/or doing close-up work
- Complaints that things are blurry
- Blinking more than usual
- Watery eyes
- Droopy eyelids
- Redness in one or both eyes
- Sensitivity to light

There are several types of visual screening tests. They include:

- **Distance vision test** (**Snellen Eye Chart**). School-age children and adults are usually tested with a wall chart. The chart has several rows of letters. The letters on the top row are the biggest. The letters on the bottom are the smallest. You or your child will stand or sit 20 feet from the chart. He or she will be asked to cover one eye and read the letters, one row at a time. Each eye is tested separately.
- **Distance vision test for preschoolers**. For children too young to read, this test uses a wall chart similar to the one for older children and adults. But instead of rows of different letters, it only has the letter E in different positions. Your child will be asked to point in the same direction as the E. Some of these charts use the letter C, or use pictures, instead.

- **Close-up vision test**. For this test, you or your child will be given a small card with written text. The lines of text get smaller as you go farther down the card. You or your child will be asked to hold the card about 14 inches away from the face, and read aloud. Both eyes are tested at the same time. This test is often given to adults over 40, as close-up vision tends to get worse as you get older.
- **Color blindness test**. Children are given a card with colored numbers or symbols hidden in a background of multicolored dots. If they can read the numbers or symbols, it means they probably are not color blind.

If your infant is getting a vision screening, your provider will check for:

- Your baby's ability to follow an object, such as a toy, with his or her eyes
- How his or her pupils (black center part of the eye) respond to a bright light
- To see if your baby blinks when a light is shone in the eye[27]

Hearing

The infant's sense of hearing is very keen at birth, and the ability to hear is evidenced as soon as the seventh month of prenatal development. Newborns prefer their mother's voices over another female when speaking the same material (DeCasper & Fifer, 1980).

27. Source: MedlinePlus, National Library of Medicine

Additionally, they will register in utero specific information heard from their mother's voice. DeCasper and Spence (1986) tested 16 infants (average age of 55.8 hours) whose mothers had previously read to them prenatally. The mothers read several passages to their fetuses, including the first 28 paragraphs of the Cat in the Hat, beginning when they were 7 months pregnant. The fetuses had been exposed to the stories an average of 67 times or 3.5 hours. When the experimental infants were tested, the target stories (previously heard) were more reinforcing than the novel story as measured by their rate of sucking. However, for control infants, the target stories were not more reinforcing than the novel story indicating that the experimental infants had heard them before.

An infant can distinguish between very similar sounds as early as one month after birth and can distinguish between a familiar and non-familiar voice even earlier. Infants are especially sensitive to the frequencies of sounds in human speech and prefer the exaggeration of infant-directed speech, which will be discussed later. Additionally, infants are innately ready to respond to the sounds of any language, but between six and nine months they show preference for listening to their native language (Jusczyk, Cutler, & Redanz, 1993). Their ability to distinguish the sounds that are not in the language around them diminishes rapidly (Cheour-Luhtanen, et al., 1995).[28]

Hearing Loss

Most children hear and listen to sounds at birth. They learn to talk by imitating the sounds they hear around them and the voices of their parents and caregivers. But that's not true for all children. In

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fact, about two or three out of every 1,000 children in the United States are born with detectable hearing loss in one or both ears. More lose hearing later during childhood. Children who have hearing loss may not learn speech and language as well as children who can hear. For this reason, it's important to detect deafness or hearing loss as early as possible.[29]

Hearing loss may be mild, moderate, severe, or profound. Profound hearing loss is what most people call deafness. Sometimes, hearing loss gets worse over time. Other times, it stays stable and does not get worse. Risk factors for infant hearing loss include:

- Family history of hearing loss
- Low birth weight

Hearing loss may occur when there is a problem in the outer or middle ear. These problems may slow or prevent sound waves from passing through. They include:

- Birth defects that cause changes in the structure of the ear canal or middle ear
- Buildup of ear wax
- Buildup of fluid behind the eardrum
- Injury to or rupture of the eardrum
- Objects stuck in the ear canal
- Scar on the eardrum from infections

Another type of hearing loss is due to a problem with the inner ear. It may occur when the tiny hair cells (nerve endings) that move sound through the ear are damaged. This type of hearing loss can be caused by:

29. Public Domain: National Institute on Deafness and Other Communication Disorders (NIDCD)

- Exposure to certain toxic chemicals or medicines while in the womb or after birth
- Genetic disorders
- Infections the mother passes to her baby in the womb (such as toxoplasmosis, measles, or herpes)
- Infections that can damage the brain after birth, such as meningitis or measles
- Problems with the structure of the inner ear
- Tumors

Central hearing loss results from damage to the auditory nerve itself, or the brain pathways that lead to the nerve and is rare in infants and children. Symptoms of central hearing loss in infants and children include:

- A newborn baby with hearing loss may not startle when there is a loud noise nearby.
- Older infants, who should respond to familiar voices, may show no reaction when spoken to.
- Children should be using single words by 15 months, and simple 2-word sentences by age 2. If they do not reach these milestones, the cause may be hearing loss.

Some children may not be diagnosed with hearing loss until they are in school. This is true even if they were born with hearing loss. Inattention and falling behind in class work may be signs of undiagnosed hearing loss.

Hearing loss makes a baby unable to hear sounds below a certain level. A baby with normal hearing will hear sounds below that level. A health care provider will examine your child with an instrument called an **otoscope** to see inside the baby's ear canal. The exam may show bone problems or signs of genetic changes that may cause hearing loss.

Two common tests are used to screen newborn infants for hearing loss:

- **Auditory brainstem response test** (ABR). ABR is an objective test that allows an audiologist to get information about a baby's hearing without needing a response from the child. This testing is typically done when a child has not passed their hearing screening test at birth or at their two-week follow-up screening.

The test is done by sending a sound into the child's ear and measuring whether or not the cochlea, or hearing organ, passes the sound to the baby's brain. Typically, a child is sleeping during the test and does not feel anything. The audiologist will put a few pads on the child's forehead and near their ears to make the measurements while the sound goes into the child's ears with soft earphones. After the testing is complete, the audiologist will talk through the results with parents/caregivers.[30]

30. From The Connection Blog, HEARTLAND Area Education Agency

Infant sleeping during ABR testing[31]

- **Otoacoustic emissions test** (OAE). Tests whether some parts of the ear respond to sound. During this test, a soft earphone is inserted into your baby's ear canal. It plays sounds and measures an "echo" response that occurs in ears with normal hearing. If there is no echo, your baby might have hearing loss. [32]

Infant tested using otoacoustic emissions[33]

31. Image from The Connection Blog, HEARTLAND Area Education Agency
32. Public Domain: National Institute on Deafness and Other Communication Disorders (NIDCD)

Older babies and young children can be taught to respond to sounds through play. These tests, known as visual response audiometry and play audiometry, can better determine the child's range of hearing.

Currently, over 30 states in the United States require newborn hearing screenings. Treating hearing loss early can allow many infants to develop normal language skills without delay. In infants born with hearing loss, treatments should start as early as age 6 months and will depend on the bay's overall health and the cause of hearing loss.[34]

Treatment may include:

- **Hearing aids**. Worn in or behind the ear, hearing aids help make sounds louder. Hearing aids can be used for different degrees of hearing loss in babies as young as 1 month. A pediatric audiologist who is experienced in treating infants and children can help you choose the best hearing aid and make sure that it fits securely and is properly adjusted. Read the NIDCD fact sheet Hearing Aids for more information.

- **Cochlear implants**. If your child won't benefit from a hearing aid, your doctor may suggest a cochlear implant. This electronic device can provide a sense of sound to people who are profoundly deaf or hard-of-hearing. The device converts sounds into electrical signals and carries them past the nonworking part of the inner ear to the brain. Cochlear implants can be surgically placed in children as young as 12 months, or sometimes earlier.

33. Public Domain: National Institute on Deafness and Other Communication Disorders (NIDCD)
34. Source: MedlinePlus, National Library of Medicine (modified by Maria Pagano)

- With training, children with cochlear implants can learn to recognize sounds and understand speech. Studies have also shown that eligible children who receive a cochlear implant before 18 months of age can develop language skills at a rate comparable to children with normal hearing, and many succeed in mainstream classrooms. Some doctors now recommend the use of two cochlear implants, one for each ear. An otolaryngologist who specializes in cochlear implants can help you decide if a cochlear implant is appropriate for your child. Read the NIDCD fact sheet Cochlear Implants for more information.

- **Hearing Assistive devices**. As your child grows, other devices may be useful. Some devices help children hear better in a classroom. Others amplify one-on-one conversations or make talking on the phone or watching TV and videos easier. Read the NIDCD fact sheet Assistive Devices for People with Hearing, Voice, Speech, or Language Disorders for more information.[35]

What Is A Cochlear Implant?

A cochlear implant is a small, complex electronic device that can help to provide a sense of sound to a person who is profoundly deaf or severely hard-of-hearing. The implant consists of an external portion that sits behind the ear and a second portion that is surgically placed under the skin (see figure below). An implant has the following parts:

- A microphone, which picks up sound from the environment.
- A speech processor, which selects and arranges sounds picked

35. Public Domain: National Institute on Deafness and Other Communication Disorders (NIDCD)

up by the microphone.
- A transmitter and receiver/stimulator, which receive signals from the speech processor and convert them into electric impulses.
- An electrode array, which is a group of electrodes that collects the impulses from the stimulator and sends them to different regions of the auditory nerve.

Ear with cochlear implant
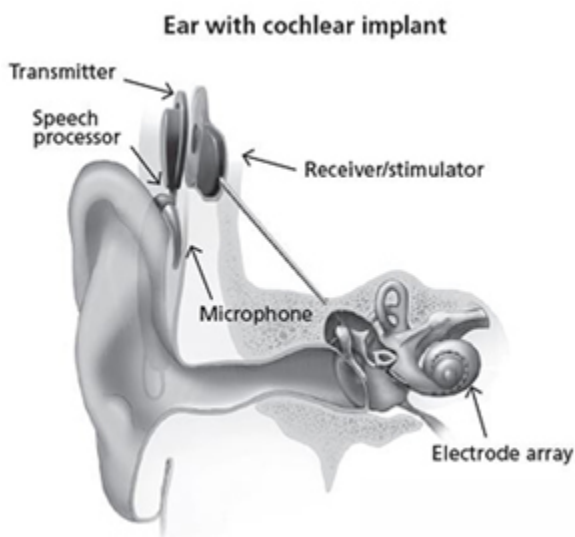
An implant does not restore normal hearing. Instead, it can give a deaf person a useful representation of sounds in the environment and help him or her to understand speech.

A cochlear implant is very different from a hearing aid. Hearing aids amplify sounds so they may be detected by damaged ears. Cochlear implants bypass damaged portions of the ear and directly stimulate the auditory nerve. Signals generated by the implant are sent by way of the auditory nerve to the brain, which recognizes the signals as sound. Hearing through a cochlear implant is different from normal hearing and takes time to learn or relearn. However, it

allows many people to recognize warning signals, understand other sounds in the environment, and understand speech in person or over the telephone.

Children and adults who are deaf or severely hard-of-hearing can be fitted for cochlear implants. As of December 2012, approximately 324,200 registered devices have been implanted worldwide. In the United States, roughly 58,000 devices have been implanted in adults and 38,000 in children. (Estimates provided by the U.S. Food and Drug Administration [FDA], as reported by cochlear implant manufacturers.)

The FDA first approved cochlear implants in the mid-1980s to treat hearing loss in adults. Since 2000, cochlear implants have been FDA-approved for use in eligible children beginning at 12 months of age. For young children who are deaf or severely hard-of-hearing, using a cochlear implant while they are young exposes them to sounds during an optimal period to develop speech and language skills. Research has shown that when these children receive a cochlear implant followed by intensive therapy before they are 18 months old, they are better able to hear, comprehend sound and music, and speak than their peers who receive implants when they are older. Studies have also shown that eligible children who receive a cochlear implant before 18 months of age develop language skills at a rate comparable to children with normal hearing, and many succeed in mainstream classrooms.

Some adults who have lost all or most of their hearing later in life can also benefit from cochlear implants. They learn to associate the signals from the implant with sounds they remember, including speech, without requiring any visual cues such as those provided by lipreading or sign language.

Use of a cochlear implant requires both a surgical procedure and significant therapy to learn or relearn the sense of hearing. Not everyone performs at the same level with this device. The decision to receive an implant should involve discussions with medical specialists, including an experienced cochlear-implant surgeon. The process can be expensive. For example, a person's health insurance

may cover the expense, but not always. Some individuals may choose not to have a cochlear implant for a variety of personal reasons. Surgical implantations are almost always safe, although complications are a risk factor, just as with any kind of surgery. An additional consideration is learning to interpret the sounds created by an implant. This process takes time and practice. Speech-language pathologists and audiologists are frequently involved in this learning process. Prior to implantation, all of these factors need to be considered.

The National Institute on Deafness and Other Communication Disorders (NIDCD) supports research to enhance the benefits of cochlear implants. Scientists are exploring whether using a shortened electrode array, inserted into a portion of the cochlea, for example, can help individuals whose hearing loss is limited to the higher frequencies while preserving their hearing of lower frequencies. Researchers also are looking at the potential benefits of pairing a cochlear implant in one ear with either another cochlear implant or a hearing aid in the other ear.[36]

Learning to Communicate

Children who are deaf or hard-of-hearing can learn to communicate in several ways, including **American Sign Language**. Find out as much as you can about the communication choices and ask your health care team to refer you to experts if you want to know more. Because language development begins early, regardless of the communication mode you choose, you should engage with your child and begin intervention as soon as possible.

Here are the main options to help children with hearing loss express themselves and interact with others:

- **Auditory-oral and auditory-verbal options** combine natural hearing ability and hearing devices, such as hearing aids and

36. Public Domain National Institute on Deafness and Other Communication Disorders (NIDCD)

cochlear implants, with other strategies to help children develop speech and English-language skills. Auditory-oral options use visual cues such as lipreading and sign language, while auditory-verbal options work to strengthen listening skills.

- **Signed English** is a system that uses signs to represent words or phrases in English. Signed English is designed to enhance the use of both spoken and written English.
- **American Sign Language** (ASL) is a language used by some children who are deaf and their families and communities. ASL consists of hand signs, body movements, and facial expressions. ASL has its own grammar, which is different from English. It has no written form. Read the NIDCD fact sheet American Sign Language for more information.
- Combined options use portions of the various methods listed above. For example, some deaf children who use auditory-oral options also learn sign language. Children who use ASL also learn to read and write in English. Combined options can expose children who are deaf or hard-of-hearing to many ways to communicate with others.

Like all children, children who are deaf or hard-of-hearing can develop strong academic, social, and emotional skills and succeed in school. [37]

Touch and Pain

Immediately after birth, a newborn is sensitive to touch and temperature, and is also highly sensitive to pain, responding with

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37. Public Domain: National Institute on Deafness and Other Communication Disorders (NIDCD)

crying and cardiovascular responses (Balaban & Reisenauer, 2013). Newborns who are circumcised, which is the surgical removal of the foreskin of the penis, without anesthesia experience pain as demonstrated by increased blood pressure, increased heart rate, decreased oxygen in the blood, and a surge of stress hormones (United States National Library of Medicine, 2016). Research has demonstrated that infants who were circumcised without anesthesia experienced more pain and fear during routine childhood vaccines. Fortunately, today many local pain killers are currently used during circumcision.

Taste and Smell

Studies of taste and smell demonstrate that babies respond with different facial expressions, suggesting that certain preferences are innate. Newborns can distinguish between sour, bitter, sweet, and salty flavors and show a preference for sweet flavors. Newborns also prefer the smell of their mothers. An infant only 6 days old is significantly more likely to turn toward its own mother's breast pad than to the breast pad of another baby's mother (Porter, Makin, Davis, & Christensen, 1992), and within hours of birth an infant also shows a preference for the face of its own mother (Bushnell, 2001; Bushnell, Sai, & Mullin, 1989).[38]

Physical Growth

Overall Physical Growth: The average newborn in the United States

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weighs about 7.5 pounds (between 5 and 10 pounds) and is about 20 inches in length. For the first few days of life, infants typically lose about 5 percent of their body weight as they eliminate waste and get used to feeding. This often goes unnoticed by most parents but can be cause for concern for those who have a smaller infant. This weight loss is temporary, however, and is followed by a rapid period of growth. By the time an infant is 4 months old, it usually doubles in weight and by one year has tripled the birth weight. By age 2, the weight has quadrupled, so we can expect that a 2-year-old should weigh between 20 and 40 pounds. The average length at one year is about 29.5 inches and at two years it is around 34.4 inches (Bloem, 2007). [39]

A newborn being weighed. [40]

39. Child Growth and Development: An Open Educational Resources Publication by College of the Canyons by Jennifer Paris, Antoinette Ricardo, and Dawn Richmond is licensed under CC BY 4.0
40. Image by Trei Brundrett is licensed under CC BY-SA 2.0

Growth is influenced by the two major trends, **cephalocaudal development** (from head to tail) and **proximodistal** development (from the midline outward). These patterns suggest that growth starts from the head outward and from the midline out to the extremities, respectively. In early childhood, the average child grows 2½ inches and between 5 to 7 pounds a year. Girls are slightly smaller and lighter than boys. Infants' body fat begins to decrease, and the head reaches a more proportional size given the changes in length. Of particular interest to this growth are the **epiphyses** (the rounded end of a long bone), or growth centers, where **cartilage** turns to bone. Looking at X-rays of these areas allows doctors to provide estimates of Skeletal Age, or judgment of the progression of physical development.

Structure of a Long Bone

Spongy bone

Medullary cavity

Compact bone

Epiphysis

Metaphysis

Diaphysis (shaft)

Metaphysis
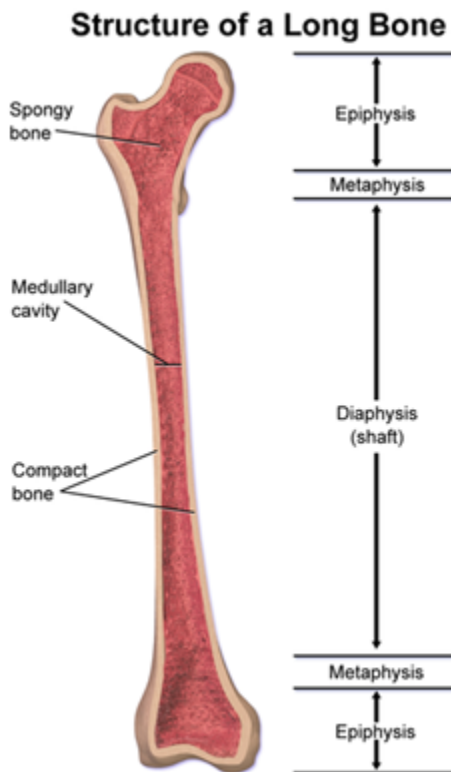
Epiphysis

Structure of a long bone, with epiphysis labeled at top and bottom.[41]
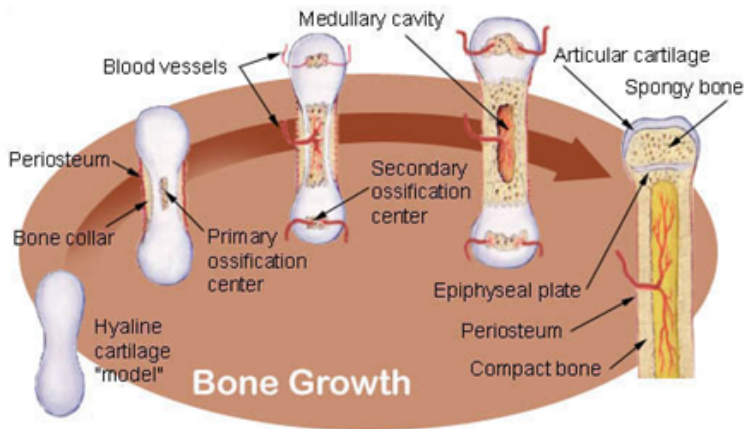
Bone Growth

When cartilage growth ceases, usually in the early twenties, the **epiphyseal plate** completely **ossifies** so that only a thin **epiphyseal line** remains, and the bones can no longer grow in length. Bone growth is under the

41. From Wikimedia. Blausen.com staff (2014). "Medical gallery of Blausen Medical 2014". WikiJournal of Medicine . DOI:10.15347/ wjm/2014.010. ISSN 2002-4436.   Licensed under CC BY 3.0

influence of growth hormone from the [anterior](#) pituitary
gland and sex hormones from the ovaries and testes.[42]

Two hormones are very important to this growth process. The first
is **Human Growth Hormone** (HGH) which influences all growth
except that in the **Central Nervous System** (CNS). The hormone
influencing growth in the CNS is called **Thyroid Stimulating
Hormone**. Together these hormones influence the growth in early
childhood.

Another dramatic physical change that takes place in the first
several years of life is the change in body proportions. The head
initially makes up about 50 percent of our entire length when we
are developing in the womb. At birth, the head makes up about 25
percent of our length, and by age 25 it comprises about 20 percent
our length ((think about how much of your length would be head if
the proportions were still the same!).[43]

Body proportions from infancy to adulthood.[44]

42. SEER Training Modules, *Bone Development and Growth*. U. S.
National Institutes of Health, National Cancer Institute. Public
Domain
43. Child Growth and Development: An Open Educational Resources
Publication by College of the Canyons by Jennifer Paris, Antoinette
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44. Image is in the public domain
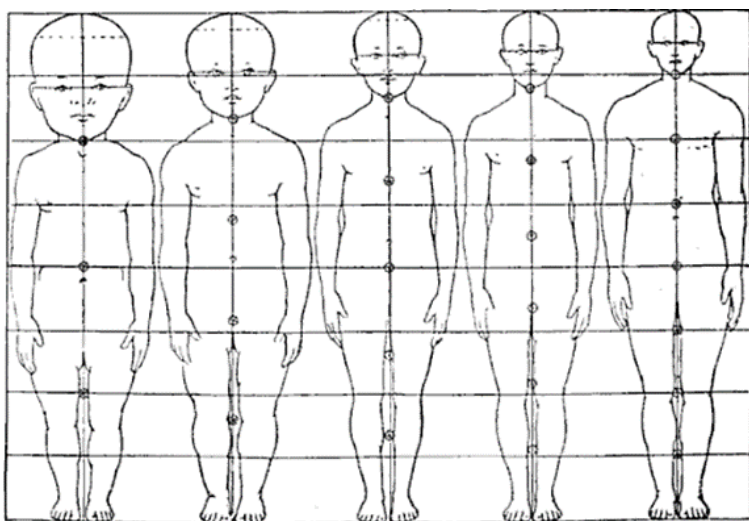
Motor Development

Infants and children grow and develop at a rapid pace during the first few years of life. The development of both gross and fine motor skills helps a child go from a completely dependent newborn to an independently functioning toddler in about a 3-year span.[45]

Motor development occurs in an orderly sequence as infants move from reflexive reactions (e.g., sucking and rooting) to more advanced motor functioning. As previously mentioned, development occurs according to the cephalocaudal and proximodistal principles. For instance, babies first learn to hold their heads up, then to sit with assistance, then to sit unassisted, followed later by crawling, pulling up, **cruising** or walking while holding on to something, and then unassisted walking (Eisenberg,

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Murkoff, & Hathaway, 1989). As motor skills develop, there are certain developmental milestones that young children should achieve. For each milestone there is an average age, as well as a range of ages in which the milestone should be reached. An example of a developmental milestone is a baby holding up its head. Babies on average are able to hold up their head at 6 weeks old, and 90% of babies achieve this between 3 weeks and 4 months old. On average, most babies sit alone at 7 months old. Sitting involves both coordination and muscle strength, and 90% of babies achieve this milestone between 5 and 9 months old. If the child is displaying delays on several milestones, that is reason for concern, and the parent or caregiver should discuss this with the child's pediatrician. Developmental delays can be identified and addressed through early intervention.[46]

Fine motor skills focus on the muscles in our fingers, toes, and eyes, and enable coordination of small actions (e.g., grasping a toy, writing with a pencil, and using a spoon). Newborns cannot grasp objects voluntarily but do wave their arms toward objects of interest. At about 4 months of age, the infant is able to reach for an object, first with both arms and within a few weeks, with only one arm. At this age grasping an object involves the use of the fingers and palm, but no thumbs. This is known as the palmar grasp. The use of the thumb comes at about 9 months of age when the infant is able to grasp an object using the forefinger and thumb. Now the infant uses a pincer grasp, and this ability greatly enhances the ability to control and manipulate an object and infants take great delight in this newfound ability. They may spend hours picking up small objects from the floor and placing them in containers. By 9 months, an infant can also watch a moving object, reach for it as it approaches, and grab it.

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Fine motor skills are also being refined in activities such as pouring water into a container, drawing, coloring, and using scissors. Some children's songs promote fine motor skills as well (have you ever heard of the song "itsy, bitsy, spider"?). Mastering the fine art of cutting one's own fingernails or tying shoes will take a lot of practice and maturation. Motor skills continue to develop in middle childhood-but for preschoolers, play that deliberately involves these skills is emphasized.

Gross motor skills focus on large muscle groups that control our head, torso, arms and legs and involve larger movements (e.g., balancing, running, and jumping). These skills begin to develop first. Examples include moving to bring the chin up when lying on the stomach, moving the chest up, and rocking back and forth on hands and knees. But it also includes exploring an object with one's feet as many babies do as early as 8 weeks of age if seated in a carrier or other device that frees the hips. This may be easier than reaching for an object with the hands, which requires much more practice (Berk, 2007). Sometimes an infant will try to move toward an object while crawling and surprisingly move backward because of the greater amount of strength in the arms than in the legs.

Early childhood is the time period when most children acquire the basic skills for locomotion, such as running, jumping, and skipping, and object control skills, such as throwing, catching, and kicking (Clark, 1994). Children continue to improve their gross motor skills as they run and jump. Fine motor skills are also being refined in activities, such as pouring water into a container, drawing, coloring, and buttoning coats and using scissors. The development of greater coordination of muscles groups and finer precision can be seen during this time period. Thus, average 2-year-olds may be able to run with slightly better coordination than they managed as a toddler, yet they would have difficulty peddling a tricycle, something the typical 3-year-old can do. We see similar changes in fine motor skills with 4-year-olds who no longer struggle to put on their clothes, something they may have had problems with two years earlier. Motor skills continue to develop into middle

childhood, but for those in early childhood, play that deliberately involves these skills is emphasized. The table below shows the changes in gross and fine motor skills that can be found between the ages of 2 and 5. [47]

Changes in Gross and Fine Motor Skills in Early Childhood [48]

	Gross Motor Skills	Fine Motor Skills
Age 2	• Can kick a ball without losing balance • Can pick up objects while standing, without losing balance *(This often occurs by 15 months. It is a cause for concern if not seen by 2 years).* • Can run with better coordination. *(May still have a wide stance).*	• Able to turn a door knob • Can look through a book turning one page at a time • Can build a tower of 6 to 7 cubes • Able to put on simple clothes without help *(The child is often better at removing clothes than putting them on).*
Age 3	• Can briefly balance and hop on one foot • May walk up stairs with alternating feet (without holding the rail) • Can pedal a tricycle	• Can build a block tower of more than nine cubes • Can easily place small objects in a small opening • Can copy a circle • Can draw a person with 3 parts • Can feed self easily
Age 4	• Shows improved balance • Hops on one foot without losing balance • Throws a ball overhand with coordination	• Can cut out a picture using scissors • Can draw a square • Manages a spoon and fork neatly while eating • Puts on clothes properly
Age 5	• Has better coordination (getting the arms, legs, and body to work together) • Skips, jumps, and hops with good balance • Stays balanced while standing on one foot with eyes closed	• Shows more skill with simple tools and writing utensils • Can copy a triangle • Can use a knife to spread soft foods

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48. Courtesy of MedlinePlus from the National Library of Medicine (NLM)

Children's Art

Children's art highlights many developmental changes. Kellogg (1969) noted that children's drawings underwent several transformations. Starting with about 20 different types of scribbles at age 2, children move on to experimenting with the placement of scribbles on a page. By age 3 they are using the basic structure of scribbles to create shapes and are beginning to combine these shapes to create more complex images. By 4 or 5 children are creating images that are more recognizable representations of the world. These changes are a function of improvement in motor skills, perceptual development, and cognitive understanding of the world (Cote & Golbeck, 2007).

The drawing below represents the features which are typically found in young children's drawings of self and others. These types of images emerge in children's drawing at about the age of 3 and have been observed in the drawings of young children around the world (Gernhardt, Rubeling & Keller, 2015), but there are cultural variations in the size, number of facial features, and emotional expressions displayed. Gernhardt et al. found that children from Western contexts (i.e., urban areas of Germany and Sweden) and urban educated non-Western contexts (i.e., urban areas of Turkey, Costa Rica and Estonia) drew larger images, with more facial detail and more positive emotional expressions, while those from non-Western rural contexts (i.e., rural areas of Cameroon and India) depicted themselves as smaller, with less facial details and a more neutral emotional expression. The authors suggest that cultural norms of non-Western traditionally rural cultures, which emphasize the social group rather than the individual, may be one of the factors for the smaller size of the figures compared to the larger figures from children in the Western cultures which emphasize the individual.[49]

49. Lifespan Development: A Psychological Perspective 2nd Edition by

Four-year-old's drawing [50]

From the ages of about 6 to 11 children begin to gain greater control over the movement of their bodies and begin to master many gross and fine motor skills that eluded the younger child. In addition, rates of growth generally slow. Typically, a child will gain about 5-7 pounds a year and grow about 2-3 inches per year (CDC, 2000). They also tend to slim down and gain muscle strength and lung capacity making it possible to engage in strenuous physical

50.

activity for long periods of time. The beginning of the growth spurt, which occurs prior to puberty, begins two years earlier for females than males. The mean age for the beginning of the growth spurt for girls is nine, while for boys it is eleven. Children of this age tend to sharpen their abilities to perform both gross motor skills, such as riding a bike, and fine motor skills, such as cutting their fingernails. In gross motor skills (involving large muscles) boys typically outperform girls, while with fine motor skills (small muscles) girls outperform the boys. These improvements in motor skills are related to brain growth and experience during this developmental period.[51]

Sports

Middle childhood seems to be a great time to introduce children to organized sports, and in fact, many parents do. Nearly 3 million children play soccer in the United States (United States Youth Soccer, 2012). This activity promises to help children build social skills, improve athletically and learn a sense of competition. However, it has been suggested that the emphasis on competition and athletic skill can be counterproductive and lead children to grow tired of the game and want to quit. In many respects, it appears that children's activities are no longer children's activities once adults become involved and approach the games as adults rather than children. The U. S. Soccer Federation recently advised coaches to reduce the amount of drilling engaged in during practice and to allow children to play more freely and to choose their own positions. The hope is that this will build on their love of the game and foster their natural talents.

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Sports are important for children. Children's participation in sports has been linked to:

- Higher levels of satisfaction with family and overall quality of life in children
- Improved physical and emotional development
- Better academic performance

Yet, a study on children's sports in the United States (Sabo & Veliz, 2008) has found that gender, poverty, location, ethnicity, and disability can limit opportunities to engage in sports. Girls were more likely to have never participated in any type of sport (see pie charts below). They also found that fathers may not be providing their daughters as much support as they do their sons. While boys rated their fathers as their biggest mentor who taught them the most about sports, girls rated coaches and physical education teachers as their key mentors. Sabo and Veliz also found that children in suburban neighborhoods had a much higher participation of sports than boys and girls living in rural or urban centers.[52]
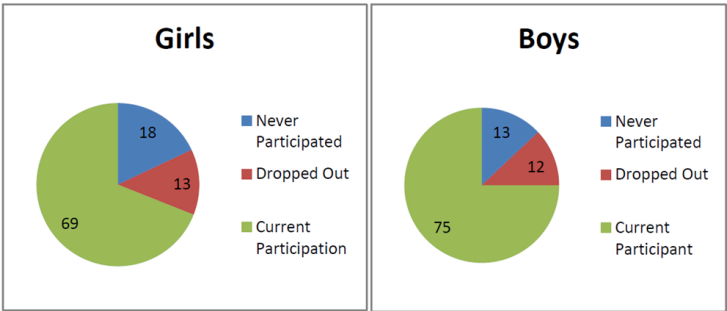
Total girls (n=1051). Total boys (n=1081)

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Finally, Sabo and Veliz asked children who had dropped out of organized sports why they left. For both girls and boys, the number one answer was that it was no longer any fun (see table below). According to the Sport Policy and Research Collaborative (SPARC) (2013), almost 1 in 3 children drop out of organized sports, and while there are many factors involved in the decisions to drop out, one suggestion has been the lack of training that coaches of children's sports receive may be contributing to this attrition (Barnett, Smoll & Smith, 1992). Several studies have found that when coaches receive proper training, the drop-out rate is about 5% instead of the usual 30% (Fraser-Thomas, Côté, & Deakin, 2005; SPARC, 2013). [54]

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Girls		Boys	
I was not having fun	38%	I was not having fun	39%
I wanted to focus more on studying and grades	36%	I had a health problem or injury	29%
I had a health problem or injury	27%	I wanted to focus more on studying and grades	26%
I wanted to focus more on other clubs or activities	22%	I did not like or get along with the coach	22%
I did not like or get along with the coach	18%	I wanted to focus more on other clubs or activities	18%
I did not like or get along with others on the team	16%	I did not like or get along with others on the team	16%
I was not a good enough player	15%	I was not a good enough player	15%
My family worried about me getting hurt or injured while playing sports	14%	My family worried about me getting hurt or injured while playing sports	12%

Source: Sabo, D., & Veliz, P. (2008). Go Out and Play: Youth Sports in America. East Meadows, NY: Women's Sports

Response to Sabo and Veliz (2008) to the question, "Why did you drop out of playing sports?"[55]

Welcome to the world of esports: According to Discover Esports (2017), esports *is a form of competition with the medium being video games.* Players use computers or specific video game consoles to play video games against each other. In addition to playing themselves, children may just watch others play the video games. The recent SPARC (2016) report on the "State of Play" in the United States highlights a disturbing trend. One in four children between the ages of 5 and 16 rate playing computer games with their friends

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as a form of exercise. Over half of males and about 20% of females, aged 12-19, say they are fans of esports.

Since 2008 there has also been a downward trend in the number of sports children are engaged in, despite a body of research evidence that suggests that specializing in only one activity can increase the chances of injury, while playing multiple sports is protective (SPARC, 2016). A University of Wisconsin study found that 49% of athletes who specialized in a sport experienced an injury compared with 23% of those who played multiple sports (McGuine, 2016).

Physical Education: For many children, physical education in school is a key component in introducing children to sports. After years of schools cutting back on physical education programs, there has been a turnaround, prompted by concerns over childhood obesity and the related health issues. Despite these changes, currently only the state of Oregon and the District of Columbia meet PE guidelines of a minimum of 150 minutes per week of physical activity in elementary school and 225 minutes in middle school (SPARC, 2016).[56]

Childhood Obesity

The decreased participation in school physical education and youth sports is just one of many factors that has led to an increase in children being overweight or **obese**. The current measurement for determining excess weight is the Body Mass Index (BMI) *which expresses the relationship of height to weight.* According to the Centers for Disease Control and Prevention (CDC), children's whose

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BMI is at or above the 85th percentile for their age are considered **overweight**, while children who are at or above the 95th percentile are considered **obese** (Lu, 2016). In 2015-2016 approximately 13.9% of 2-5 year-olds and 18.4% of 6-11 year-olds were obese (Hales, Carroll, Fryar, & Ogden, 2017). Excess weight and obesity in children are associated with a variety of medical and cognitive conditions including high blood pressure, insulin resistance, inflammation, depression, and lower academic achievement (Lu, 2016).

Being overweight has also been linked to impaired brain functioning, which includes deficits in executive functioning, working memory, mental flexibility, and decision making (Liang, Matheson, Kaye, & Boutelle, 2014). Children who ate more **saturated fats** performed worse on relational memory tasks, while eating a diet high in omega-3 fatty acids promoted relational memory skills (Davidson, 2014). Using animal studies Davidson et al. (2013) found that large amounts of processed sugars and saturated fat weakened the blood-brain barrier, especially in the hippocampus. This can make the brain more vulnerable to harmful substances that can impair its functioning. Another important executive functioning skill is controlling impulses and delaying gratification. Children who are overweight show less inhibitory control than normal weight children, which may make it more difficult for them to avoid unhealthy foods (Lu, 2016). Overall, being overweight as a child increases the risk for cognitive decline as one ages.

A growing concern is the lack of recognition from parents that children are overweight or obese. Katz (2015) referred to this as **oblivobesity**. Black, Park and Gregson (2015) found that parents in the United Kingdom (UK) only recognized their children as obese when they were above the 99.7th percentile while the official cut-off for obesity is at the 85th percentile. Oude Luttikhuis, Stolk, and Sauer (2010) surveyed 439 parents and found that 75% of parents of overweight children said the child had a normal weight and 50% of parents of obese children said the child had a normal weight. For these parents, overweight was considered normal and obesity was considered normal or a little heavy. Doolen, Alpert, and Miller (2009)

reported on several studies from the United Kingdom, Australia, Italy, and the United States, and in all locations, parents were more likely to misperceive their children's weight. Black et al. (2015) concluded that as the average weight of children rises, what parents consider normal also rises. Needless to say, if parents cannot identify if their children are overweight, they will not be able to intervene and assist their children with proper weight management.

An added concern is that the children themselves are not accurately identifying if they are overweight. In a United States sample of 8-15-year-olds, more than 80% of overweight boys and 70% of overweight girls misperceived their weight as normal (Sarafrazi, Hughes, & Borrud, 2014). Also noted was that as the socioeconomic status of the children rose, the frequency of these misconceptions decreased. It appeared that families with more resources were more conscious of what defines a healthy weight.

Children who are overweight tend to be rejected, ridiculed, teased and bullied by others (Stopbullying.gov, 2018). This can certainly be damaging to their self-image and popularity. In addition, obese children run the risk of suffering orthopedic problems such as knee injuries, and they have an increased risk of heart disease and stroke in adulthood (Lu, 2016). It is hard for a child who is obese to become a non-obese adult. In addition, the number of cases of pediatric diabetes has risen dramatically in recent years.

Behavioral interventions, including training children to overcome impulsive behavior, are being researched to help overweight children (Lu, 2016). Practicing inhibition has been shown to strengthen the ability to resist unhealthy foods. Parents can help their overweight children the best when they are warm and supportive without using shame or guilt. Parents can also act like the child's frontal lobe until it is developed by helping them make correct food choices and praising their efforts (Liang, et al., 2014). Research also shows that exercise, especially aerobic exercise, can help improve cognitive functioning in overweight children (Lu, 2016). Parents should take caution against emphasizing diet alone to avoid the development of any obsession about dieting that can lead

to eating disorders. Instead, increasing a child's activity level is most helpful.

In 2018 the American Psychological Association (APA) developed a clinical practice guideline that recommends family-based, multicomponent behavioral interventions to treat obesity and overweight in children 2 to 18 (Weir, 2019). The guidelines recommend counseling on diet, physical activity and "teaching parents strategies for goal setting, problem-solving, monitoring children's behaviors, and modeling positive parental behaviors," (p. 32). Early research results have shown success using this model compared to controls. Because there is no quick fix for weight loss, the program recommends 26 contact hours with the family. Unfortunately, for many families cost, location, and time commitment make it difficult for them to receive the interventions. APA has recommended that behavioral treatment could be delivered in primary care offices to encourage greater particiapation. APA also recommend that schools and communities need to offer more nutritious meals to children and limit sodas and unhealthy foods.

A *Look at School Lunches*: Many children in the United States buy their lunches in the school cafeteria, so it might be worthwhile to look at the nutritional content of school lunches. You can obtain this information through your local school district's website. An example of a school menu and nutritional analysis from a school district in north central Texas is a meal consisting of pasta alfredo, bread stick, peach cup, tomato soup, a brownie, and 2% milk and is in compliance with Federal Nutritional Guidelines of 108% calories, 24 % protein, 55 % carbohydrates, 27% fat, and 8% saturated fats, according to the website. Students may also purchase chips, cookies, or ice cream along with their meals. Many school districts rely on the sale of desert and other items in the lunchrooms to make additional revenues. Many children purchase these additional items and so our look at their nutritional intake should also take this into consideration.

Consider another menu from an elementary school in the state of Washington. This sample meal consists of chicken burger, tater

tots, fruit and veggies and 1% or nonfat milk. This meal is also in compliance with Federal Nutrition Guidelines but has about 300 fewer calories, and children are not allowed to purchase additional deserts such as cookies or ice cream.[57]

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7. Theories of Cognitive Development

Learning Objectives

After reading Chapter 7, you should be better equipped to:

- List and describe Piaget's theory of cognitive development.
- Explain the main ideas of Vygotsky's Sociocultural theory.
- Compare and contrast the theories of Piaget and Vygotsky.
- Explain the concepts of Information Processing theory.
- Differentiate between the three main theories of cognitive development.

Jean Piaget's Theory of Cognitive Development

Cognition refers to thinking and memory processes, and cognitive development refers to long-term changes in these processes. One

of the most widely known perspectives about cognitive development is the cognitive stage theory of Swiss psychologist Jean Piaget. Piaget created and studied an account of how infants and children gradually become able to think logically and scientifically.

Piaget was a psychological **constructivist**: in his view, learning proceeded by the interplay of **assimilation** (adjusting new experiences to fit prior concepts) and **accommodation** (adjusting concepts to fit new experiences). The to-and-fro of these two processes leads not only to short-term learning, but also to long-term developmental change. The long-term developments are really the focus of Piaget's cognitive theory.

After observing children closely, Piaget proposed that cognition developed through four distinct stages from birth through the end of adolescence.

1. **Sensorimotor Stage** (Birth through 2 years old)
2. **Preoperational Stage** (2-7 years old)
3. **Concrete Operational Stage** (7-11 years old)
4. **Formal Operational** (12 years old- adulthood)

By stages Piaget meant a sequence of thinking patterns with the following four key features:

1. They always happen in the same order.
2. No stage is ever skipped.
3. Each stage is a significant transformation of the stage before it.
4. Each later stage incorporated the earlier stages into itself.[1]

Schema, **Assimilation** and **Accommodation**: Piaget believed that

1. Educational Psychology. Authored by: Kelvin Seifert and Rosemary Sutton. License: CC BY 2.0: From Lumen Learning (modified by Maria Pagano)

we are continuously trying to maintain cognitive equilibrium, or a balance, in what we see and what we know (Piaget, 1954). Children have much more of a challenge in maintaining this balance because they are constantly being confronted with new situations, new words, new objects, etc. All this new information needs to be organized, and a framework for organizing information is referred to as a schema. Children develop schemata through the processes of assimilation and accommodation. [2]

When faced with something new, a child may demonstrate assimilation, which is fitting the new information into an existing schema, such as calling all animals with four legs "doggies" because he or she knows the word doggie. Instead of assimilating the information, the child may demonstrate accommodation, which is expanding the framework of knowledge to accommodate the new situation and thus learning a new word to more accurately name the animal. For example, recognizing that a horse is different than a zebra means the child has accommodated, and now the child has both a zebra schema and a horse schema. Even as adults we continue to try and "make sense" of new situations by determining whether they fit into our old way of thinking (assimilation) or whether we need to modify our thoughts (accommodation).

Sensorimotor Stage

According to the Piagetian perspective, infants learn about the world during the primarily through their senses and motor abilities (Harris, 2005). These basic motor and sensory abilities provide the foundation for the cognitive skills that will emerge during the

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subsequent stages of cognitive development. Piaget called this first stage of cognitive development the **sensorimotor stage** and it occurs through the following six substages. [3]

Piaget's Six Substages of Sensorimotor Development [4]

Substage 1	**Reflexes (0–1 month)**
Substage 2	**Primary Circular Reactions (1–4 months)**
Substage 3	**Secondary Circular Reactions (4–8 months)**
Substage 4	**Coordination of Secondary Circular Reactions (8–12 months)**
Substage 5	**Tertiary Circular Reactions (12–18 months)**
Substage 6	**Beginning of Representational Thought (18–24 months)**

Substage One: Simple Reflexes (Birth through 1st month)

This active learning begins with automatic movements or reflexes. For example, the nipple of a bottle comes into contact with an infant's cheek and the infant will orient toward the object and automatically begin to suck on and lick the object. However, this is also what happens with a sour lemon, much to the infant's surprise!

Substage Two: First habits and primary circular reactions (1st through 4th month)

Fortunately, within a couple of weeks, the infant begins to discriminate between objects and adjust responses accordingly as reflexes are replaced with voluntary movements. An infant may

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accidentally engage in a behavior and find it interesting such as making a vocalization. This interest motivates trying to do it again and helps the infant learn a new behavior that originally occurred by chance. At first, most actions have to do with the body, but in months to come, will be directed more toward objects.

Substage Three: Secondary circular reactions (4th through 8th months)

During the next few months, the infant becomes more and more actively engaged in the outside world and takes delight in being able to make things happen. Repeated motion brings particular interest as the infant is able to bang two lids together from the cupboard when seated on the kitchen floor.

Substage Four: Coordination of circular reactions (8th through 12th months)

Now the infant can engage in behaviors that others perform and anticipate upcoming events. Perhaps because of continued maturation of the prefrontal cortex, the infant become capable of having a thought and carrying out a planned, goal-directed activity such as seeking a toy that has rolled under the couch. The object continues to exist in the infant's mind even when out of sight and the infant now can make attempts to retrieve it. This ability is called **object permanence.**

Substage Five: Tertiary Circular Reactions (12th through 18th months)

Infants from one year to 18 months of age more actively engage in experimentation to learn about the physical world. Gravity is learned by pouring water from a cup or pushing bowls from highchairs. The caregiver tries to help the child by picking it up again and placing it on the tray. And what happens? Another experiment! The child pushes it off the tray again causing it to fall and the caregiver to pick it up again! A closer examination of this stage causes us to really appreciate how much learning is going on at this time and how many things we come to take for granted must actually be learned. I remember handing my daughters (who are

close in age) when they were both seated in the back seat of the car a small container of candy. They struggled to move the pieces up and out of the small box and became frustrated when their fingers would lose their grip on the treats before they made it up and out of top of the boxes. They had not yet learned to simply use gravity and turn the box over in their hands! This is a wonderful and messy time of experimentation, and most learning occurs by trial and error.

Substage Six: Internalization of Schemes and Early Representational thought (18th month to 2 years of age)

The child is now able to solve problems using mental strategies, to remember something heard days before and repeat it, to engage in pretend play, and to find objects that have been moved even when out of sight. Take for instance, the child who is upstairs in a room with the door closed, supposedly taking a nap. The doorknob has a safety device on it that makes it impossible for the child to turn the knob. After trying several times in vain to push the door or turn the doorknob, the child carries out a mental strategy to get the door opened-he knocks on the door! Obviously, this is a technique learned from the past experience of hearing a knock on the door and observing someone opening the door. The child is now better equipped with mental strategies for problem-solving. This initial movement from the "hands-on" approach to knowing about the world to the more mental world of stage six marked the transition to preoperational intelligence that we will discuss in the next lesson. Part of this stage involves learning to use language.[5]

Critical Evaluation Object Permanence

The main development during the sensorimotor stage is the

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understanding that objects exist and events occur in the world independently of one's own actions ('the object or 'object permanence').

Object permanence means knowing that an object still exists, even if it is   hidden. It requires the ability to form a mental representation (i.e. a schema) of the object. For example, if you place a toy under a blanket, the child who has achieved object permanence knows it is there and can actively seek it. At the beginning of this stage the child behaves as if the toy had simply disappeared.

The attainment of object permanence generally signals the transition from the sensorimotor stage to the preoperational stage of development.

Blanket and Ball Study

Aim: Piaget (1963) wanted to investigate at what age children acquire object permanence.

Method: Piaget hid a toy under a blanket, while the child was watching, and observed whether or not the child searched for the hidden toy.

Searching for the hidden toy was evidence of object permanence. Piaget   assumed that the child could only search for a hidden toy if s/he had a mental representation of it.

Results: Piaget found that infants searched for the hidden toy when they   were around 8-months-old.

Conclusion: Children around 8 months have object permanence because they are able to form a mental representation of the object in their minds.

Evaluation: Piaget assumed the results of his study occur because the children under 8 months did not understand that the object still existed underneath the blanket (and therefore did not reach for it). However, there are alternative reasons why a child may not search for an object:

The child could become distracted or lose interest in the object and therefore lack the motivation to search for it, or simply may not

have the physical coordination to carry out the motor movements necessary for the retrieval of the object (Mehler & Dupoux, 1994).

There is evidence that object permanence occurs earlier than Piaget claimed. Bower and Wishart (1972) used a lab experiment to study infants aged between 1 – 4 months old.

Instead of using a Piaget's blanket technique they waited for the infant to reach for an object, and then turned out the lights so that the object was no longer visible. They then filmed the infant using an infrared camera. They found that the infant continued to reach for the object for up to 90 seconds after it became invisible.

Again, just like Piaget's study there are also criticisms of Bower's "reaching in the dark" findings. Each child had up to 3 minutes to complete the task and reach for the object. Within this time period, it is plausible they may have successfully completed the task by accident. For example, randomly reaching out and finding the object or even reaching out due to the distress of the lights going out (rather than reaching out with the intention of searching for an object).

Violation of Expectation Research

A further challenge to Piaget's claims comes from a series of studies designed by Renee Baillargeon. She used a technique that has come to be known as the **violation of expectation** (VOE) paradigm. It exploits the fact that infants tend to look for longer at things they have not encountered before.

In a VOE experiment, an infant is first introduced to a novel situation. They are repeatedly shown this stimulus until they indicate, by looking away, that it is no longer new to them. In Baillargeon et al's (1985, 1987) study, the habituation stimulus was a 'drawbridge' that moved through 180 degrees.

The infants are then shown two new stimuli, each of which is a variation on the habituation stimulus. In Baillargeon's experiments, one of these test stimuli is a possible event (i.e. one which could

physically happen) and the other is an impossible event (i.e. one that could not physically happen in the way it appears).

Possible versus impossible events

(a) Habituation

(c) Possible event

(b) Placing the box
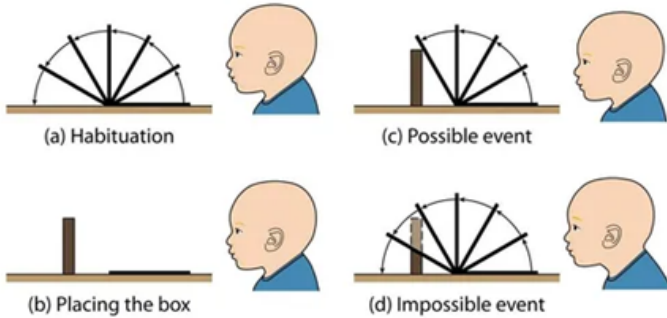
(d) Impossible event

In a classic series of tests of object permanence, Renée Baillargeon and her colleagues first habituated young infants to the sight of a screen rotating through 180 degrees. Then a box was placed in the path of the screen. In the *possible event,* the screen rotated up, occluding the box, and stopped when it reached the top of the box. In the *impossible event,* the screen rotated up, occluding the box, but then continued on through 180 degrees, appearing to pass through the space where the box was. Infants looked longer at the impossible event, showing they mentally represented the presence of the invisible box. (From Baillargeon, 1987)

In the 'drawbridge' study, a colored box was placed in the path of the drawbridge. In the possible event, the drawbridge stopped at the point where its path would be blocked by the box. In the impossible event, the drawbridge appeared to pass through the box and ended up lying flat, the box apparently having disappeared.

Baillargeon found that infants spent much longer looking at the impossible event. She concluded that this indicated surprise on the infants' part and that the infants were surprised because they had expectations about the behavior of physical objects that the impossible event had violated.

In other words, the infants knew that the box still existed behind the drawbridge and, furthermore, that they knew that one solid object cannot just pass through another. The infants in this study

were five months old, an age at which Piaget would say that such knowledge is quite beyond them.[6]

The A-not-B Error

The data does not always support Piaget's claim that certain processes are crucial in transitions from one stage to the next. For example, in Piaget's theory, an important feature in the progression into substage 4, *coordination of secondary circular reactions*, is an infant's inclination to search for a hidden object in a familiar location rather than to look for the object I in a new location. Thus, if a toy is hidden twice, initially at location A and subsequently at location B, 8- to 12-month-old infants search correctly at location A initially. But when the toy is subsequently hidden at location B, they make the mistake of continuing to search for it at location A. The **A-not-B error** is the term used to describe this common mistake. Older infants are less likely to make the A-not-B error because their concept of object permanence is more complete.[7]

Preoperational Stage

Remember that Piaget believed that we are continuously trying to maintain balance in how we understand the world. With rapid

6. McLeod, S. A. (2018 https://www.simplypsychology.org/Object-Permanence.html This worki is licensed under a Creative Commons Attribution-Noncommercial-No Derivative Works 3.0 Unported License NC-ND-3.0
7. Child Growth and Development: An Open Educational Resources Publication by College of the Canyons by Jennifer Paris, Antoinette Ricardo, and Dawn Richmond is licensed under CC BY 4.0

increases in motor skill and language development, young children are constantly encountering new experiences, objects, and words. In the module covering main developmental theories, you learned that when faced with something new, a child may either assimilate it into an existing schema by matching it with something they already know or expand their knowledge structure to accommodate the new situation. During the **preoperational stage**, many of the child's existing schemas will be challenged, expanded, and rearranged. Their whole view of the world may shift.

Piaget's second stage of cognitive development is called the preoperational stage and coincides with ages 2-7 (following the sensorimotor stage). The word **operation** refers to the use of logical rules, so sometimes this stage is misinterpreted as implying that children are illogical. While it is true that children at the beginning of the preoperational stage tend to answer questions intuitively as opposed to logically, children in this stage are learning to use language and how to think about the world symbolically. These skills help children develop the foundations they will need to consistently use operations in the next stage. Let's examine some of Piaget's assertions about children's cognitive abilities at this age.

Pretend Play

Pretending is a favorite activity at this time. For a child in the preoperational stage, a toy has qualities beyond the way it was designed to function and can now be used to stand for a character or object unlike anything originally intended. A teddy bear, for example, can be a baby or the queen of a faraway land!

Piaget believed that children's **pretend play** and experimentation helped them solidify the new schemas they were developing cognitively. This involves both assimilation and accommodation, which results in changes in their conceptions or thoughts. As children progress through the preoperational stage, they are

developing the knowledge they will need to begin to use logical operations in the next stage.

Egocentrism

Egocentrism in early childhood refers to the tendency of young children to think that everyone sees things in the same way as the child. Piaget's classic experiment on egocentrism involved showing children a three-dimensional model of a mountain and asking them to describe what a doll that is looking at the mountain from a different angle might see. Children tend to choose a picture that represents their own, rather than the doll's view. However, when children are speaking to others, they tend to use different sentence structures and vocabulary when addressing a younger child or an older adult. Consider why this difference might be observed. Do you think this indicates some awareness of the views of others? Or do you think they are simply modeling adult speech patterns?[8]

Piaget's Three Mountain Task, which tested for egocentrism[9]

Martin Hughes (1975) argued that the three mountains task did not make sense to children and was made more difficult because the children had to match   the doll's view with a photograph.

Hughes devised a task which made sense to the child. He showed children a model comprising two intersecting walls, a 'boy' doll and a 'policeman' doll. He then placed the policeman doll in various positions and asked the child to hide the boy doll from the policeman.

Hughes did this to make sure that the child understood what was being asked of him, so if s/he made mistakes they were explained and the child tried again.   Interestingly, very few mistakes were made.

Hughes (1975) Police Doll Experiment[10]
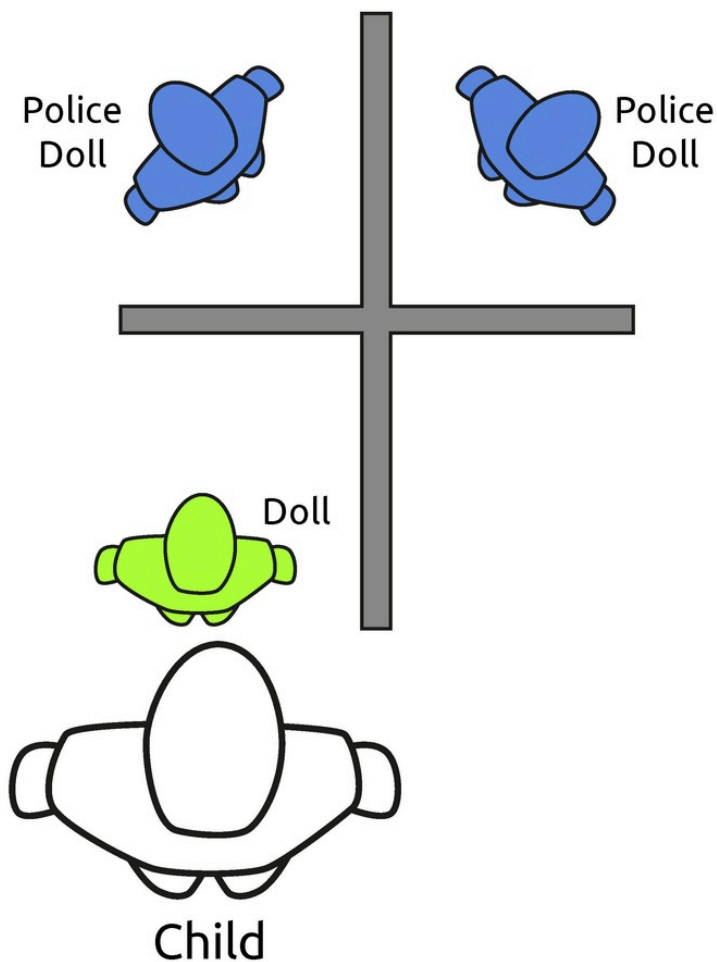
The experiment then began. Hughes brought in a second policeman doll, and placed both dolls at the end of two walls, as shown in the illustration above. The child was asked to hide the boy from both policemen, in other words he had to take account of two different points of view.

Hughes' sample comprised children between three and a half and

five years of age, of whom 90 percent gave correct answers. Even when he devised a more complex situation, with more walls and a third policeman, 90 percent of four-year-olds were successful.

This experiment showed that children have largely lost their egocentric thinking by four years of age, because they are able to take the view of another. Hughes' experiment allowed them to demonstrate this because the task made sense to the child, whereas Piaget's did not.

In Borke's (1975) test of egocentrism the child is given two identical models of a three-dimensional scene (several different scenes were used including different arrangements of toy people and animals and a mountain model similar to Piaget and Inhelder's). One of the models is mounted on a turntable so it can easily be turned by the child.

After a practice session where the child is familiarized with the materials and the idea of looking at things from another person's point of view, a doll is introduced (in Borke's study it was the character Grover from 'Sesame Street', a program the children were familiar with).

The Grover doll was placed so it was 'looking' at the model from a particular vantage point and the child was invited to turn the other model around until its view of the model matched what Grover would be able to see.

Borke (1975) found, using the 'mountains' model three-year-olds selected a correct view 42% of the time and four-year-olds selected the right view 67% of the time. With other displays, the three-years-olds' accuracy increased to 80% and the four-year olds' to 93%.[11]

11. McLeod, S. A. (2018). *Preoperational stage*. Simply Psychology. https://www.simplypsychology.org/preoperational.html This workis licensed under a Creative Commons Attribution-Noncommercial-No Derivative Works 3.0 Unported License NC-ND-3.0

Precausal Thinking

Similar to preoperational children's egocentric thinking is their structuring of cause-and-effect relationships based on their limited view of the world. Piaget coined the term "precausal thinking" to describe the way in which preoperational children use their own existing ideas or views, like in egocentrism, to explain cause-and-effect relationships. Three main concepts of causality, as displayed by children in the preoperational stage, include **animism**, **artificialism**, and **transductive reasoning**.

Animism is the belief that inanimate objects are capable of actions and have lifelike qualities. An example could be a child believing that the sidewalk was mad and made them fall down, or that the stars twinkle in the sky because they are happy. To an imaginative child, the cup may be alive, the chair that falls down and hits the child's ankle is mean, and the toys need to stay home because they are tired. Young children do seem to think that objects that move may be alive, but after age three, they seldom refer to objects as being alive (Berk, 2007). Many children's stories and movies capitalize on animistic thinking. Do you remember some of the classic stories that make use of the idea of objects being alive and engaging in lifelike actions?

Artificialism refers to the belief that environmental characteristics can be attributed to human actions or interventions. For example, a child might say that it is windy outside because someone is blowing very hard, or the clouds are white because someone painted them that color.

Finally, precausal thinking is categorized by transductive reasoning. **Transductive reasoning** is when a child fails to understand the true relationships between cause and effect. Unlike deductive or inductive reasoning (general to specific, or specific to general), transductive reasoning refers to when a child reasons from specific to specific, drawing a relationship between two separate events that are otherwise unrelated. For example, if a child hears

a dog bark and then a balloon pop, the child would conclude that because the dog barked, the balloon popped. Related to this is **syncretism,** which refers to a tendency to think that if two events occur simultaneously, one caused the other. An example of this might be a child asking the question, "if I put on my bathing suit will it turn to summer?"

Cognition Errors

Between about the ages of four and seven, children tend to become very curious and ask many questions, beginning the use of primitive reasoning. There is an increase in curiosity 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 acquired it.

Centration and **conservation** are characteristic of preoperative thought. **Centration** is the act of focusing all attention on one characteristic or dimension of a situation while disregarding all others. An example of centration is a child focusing on the *number* of pieces of cake that each person has, regardless of the size of the pieces. Centration is one of the reasons that young children have difficulty understanding the concept of conservation. **Conservation** is the awareness that altering a substance's appearance does not change its basic properties. Children at this stage are unaware of conservation and exhibit centration. Imagine a 2-year-old and 4-year-old eating lunch. The 4-year-old has a whole peanut butter and jelly sandwich. He notices, however, that his younger sister's sandwich is cut in half and protests, "She has more!" He is exhibiting centration by focusing on the number of pieces, which results in a conservation error.

(a)　　　　　　　(b)　　　　　　　(c)
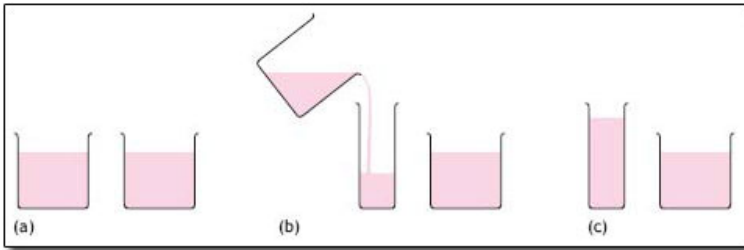
Demonstration of the conservation of liquid. Does pouring liquid in a tall, narrow container make it have more?

In Piaget's famous conservation task, a child is presented with two identical beakers containing the same amount of liquid. The child usually notes that the beakers do contain the same amount of liquid. When one of the beakers is poured into a taller and thinner container, children who are younger than seven or eight years old typically say that the two beakers no longer contain the same amount of liquid, and that the taller container holds the larger quantity (centration), without taking into consideration the fact that both beakers were previously noted to contain the same amount of liquid.

Irreversibility is also demonstrated during this stage and is closely related to the ideas of centration and conservation. **Irreversibility** refers to the young child's difficulty mentally reversing a sequence of events. In the same beaker situation, the child does not realize that, if the sequence of events was reversed and the water from the tall beaker was poured back into its original beaker, then the same amount of water would exist.

Centration, conservation errors, and irreversibility are indications that young children are reliant on visual representations. Another example of children's reliance on visual representations is their misunderstanding of "less than" or "more than". When two rows containing equal amounts of blocks are placed in front of a child with one row spread farther apart than the other, the child will think that the row spread farther contains more blocks.

Class inclusion refers to a kind of conceptual thinking that children in the preoperational stage cannot yet grasp. Children's inability to focus on two aspects of a situation at once (centration) inhibits them from understanding the principle that one category or class can contain several different subcategories or classes. Preoperational children also have difficulty understanding that an object can be classified in more than one way. For example, a four-year-old girl may be shown a picture of eight dogs and three cats. The girl knows what cats and dogs are, and she is aware that they are both animals. However, when asked, "Are there more dogs or more animals?" she is likely to answer "more dogs." This is due to her difficulty focusing on the two subclasses and the larger class all at the same time. She may have been able to view the dogs as dogs or animals, but struggled when trying to classify them as both, simultaneously. Similar to this is a concept relating to intuitive thought, known as **transitive inference**.

Transitive inference is using previous knowledge to determine the missing piece, using basic logic. Children in the preoperational stage lack this logic. An example of transitive inference would be when a child is presented with the information "A" is greater than "B" and "B" is greater than "C." The young child may have difficulty understanding that "A" is also greater than "C."

As the child's vocabulary improves and more schemes are developed, they are more able to think logically, demonstrate an understanding of conservation, and classify objects.[12]

12. Modification, adaptation and original content authored by

Limitations in the Child's Thinking

Piaget focused most of the description of this stage on limitations in the child's thinking, identifying a number of mental tasks which children seem unable to do.

These include the inability to decenter, conserve, understand seriation (the inability to understand that objects can be organized into a logical series or order) and to carry out inclusion tasks.

Children in the preoperational stage are able to focus on only one aspect or dimension of problems (i.e. centration). For example, suppose you arrange two rows of blocks in such a way that a row of 5 blocks is longer than a row of 7 blocks.

Preoperational children can generally count the blocks in each row and tell you The number contained in each. However, if you ask which row has more, they will likely say that it is the one that makes the longer line, because they cannot simultaneously focus on both the length and the number. This inability to decenter contributes to the preoperational child's egocentrism.

Conservation is the understanding that something stays the same in quantity even though its appearance changes. To be more technical, conservation is the ability to understand that redistributing material does not affect its mass, number or volume. The ability to solve this and other "conservation" problems signals the transition to the next stage. So, what do these tasks tell us about the limitations of preoperational thought in general? Piaget drew a number of related conclusions:

1) Understanding of these situations is 'perception bound'. The child is drawn by changes in the appearance of the materials to conclude that a change has occurred.

2) Thinking is 'centered' on one aspect of the situation. Children

notice changes in the level of water or in the length of clay without noticing that other aspects of the situation have changed simultaneously.

3) Thinking is focused on states rather than on transformations. Children fail to track what has happened to materials and simply make an intuitive judgment based on how they appear 'now'.

4) Thinking is 'irreversible' in that the child cannot appreciate that a reverse transformation would return the material to its original state. Reversibility is a crucial aspect of the logical (operational) thought of later stages.[13]

Concrete Operational Stage

From ages 7 to 11, children are in what Piaget referred to as the **concrete operational stage** of cognitive development (Crain, 2005). This involves mastering the use of logic in concrete ways. The word concrete refers to that which is tangible; that which can be seen, touched, or experienced directly. The concrete operational child is able to make use of logical principles in solving problems involving the physical world. For example, the child can understand principles of cause and effect, size, and distance. The child can use logic to solve problems tied to their own direct experience, but has trouble solving hypothetical problems or considering more abstract problems. The child uses **inductive reasoning**, which is a logical process in which multiple premises believed to be true are combined to obtain a specific conclusion. For example, a child has

13. McLeod, S. A. (2018). *Preoperational stage.* Simply Psychology. https://www.simplypsychology.org/preoperational.html This work is licensed under a Creative Commons Attribution-Noncommercial-No Derivative Works 3.0 Unported License NC-ND-3.0

one friend who is rude, another friend who is also rude, and the same is true for a third friend. The child may conclude that friends are rude. We will see that this way of thinking tends to change during adolescence being replaced with **deductive reasoning**.

Children studying.[14]

We will now explore some of the major abilities that the concrete child exhibits.

Classification: As children's experiences and vocabularies grow, they build schemata and are able to organize objects in many different ways. They also classification hierarchies and can arrange objects into a variety of classes and subclasses. Identity: One feature of concrete operational thought is the understanding that objects

14. Image is licensed under CC0

have qualities that do not change even if the object is altered in some way. For instance, mass of an object does not change by rearranging it. A piece of chalk is still chalk even when the piece is broken in two.

Reversibility: The child learns that some things that have been changed can be returned to their original state. Water can be frozen and then thawed to become liquid again, but eggs cannot be unscrambled. Arithmetic operations are reversible as well: 2 3 = 5 and 5 – 3 = 2. Many of these cognitive skills are incorporated into the school's curriculum through mathematical problems and in worksheets about which situations are reversible or irreversible.

Conservation: Remember the example in our last chapter of preoperational children thinking that a tall beaker filled with 8 ounces of water was "more" than a   short, wide bowl filled with 8 ounces of water? Concrete operational children can understand the concept of conservation which means that changing one quality (in this example, height or water level) can be compensated for by changes in another quality (width). Consequently, there is the same amount of water in each container, although one is taller and narrower and the other is shorter and wider.

Decentration: Concrete operational children no longer focus on only one dimension of any object (such as the height of the glass) and instead consider the changes in other dimensions too (such as the width of the glass). This allows   for conservation to occur.

Seriation: Arranging items along a quantitative dimension, such as length or weight, in a methodical way is now demonstrated by the concrete operational child. For example, they can methodically arrange a series of different-sized sticks in order by length, while younger children approach a similar task in a haphazard way.[15]

15. Lifespan Development: A Psychological Perspective 2nd Edition by Martha Lally and Suzanne Valentine-French is licensed under CC BY-NC-SA 3.0[15] Image by MehreenH is licensed CC BY-SA 4.0
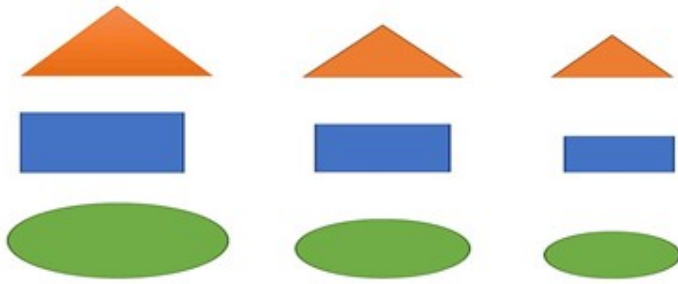
Example of a seriation task that involves sorting by shape and size.[15]

These new cognitive skills increase the child's understanding of the physical world, however according to Piaget, they still cannot think in abstract ways. Additionally, they do not think in systematic scientific ways. For example, when asked which variables influence the period that a pendulum takes to complete its arc and given weights they can attach to strings in order to do experiments, most children younger than 12 perform biased experiments from which no conclusions can be drawn (Inhelder & Piaget, 1958).)[16]

16. Lifespan Development: A Psychological Perspective 2nd Edition by Martha Lally and Suzanne Valentine-French is licensed under CC BY-NC-SA 3.0[17] Wikipedia, licensed under CC BY SA 3.0

Horizontal Decalage

Piaget used the term **horizontal décalage** refers to fact that once a child learns a certain function, he or she does not have the capability to immediately apply the learned function to all problems. In other words, "a horizontal décalage arises when a cognitive structure that can be successfully applied to task X cannot, though it is composed of the same organization of logical operations, be extended to task Y." Horizontal décalage is frequently used in reference to a child's ability to solve different conservation tasks. This concept recognizes that an individual child will not necessarily be on the same level of functioning in all possible areas of performance. Rather, "concepts and schemas develop through operation on and manipulation of objects in a specific manner."

An example of horizontal décalage is the invariance of quantity, which is typically mastered around the age of 6 or 7 when matter is concerned, at the age of 9 or 10 when weight is concerned, and around 11 or 12 years old when the invariant is volume. A 7-year-old child understands that when one of two equivalent balls of clay is transformed into a sausage-shape, the two lumps still consist of equal amounts of clay. The child, however, fails to correctly comprehend that the differently shaped clumps of clay weigh the same. Both tasks are similar, but the child is clearly unable to apply his understanding about the first situation to the second situation. A comparable phenomenon can be seen in a child's increasing ability to perform seriation tasks, which consists of ordering objects according to increasing or decreasing size. The ability to arrange rods in order of decreasing/increasing size is always acquired prior to the capacity to seriate according to weight.[17]

Formal Operational Stage

The **formal operational stage** begins at approximately age twelve and lasts into adulthood. As adolescents enter this stage, they gain the ability to think in an abstract manner by manipulating ideas in their head, without any dependence on concrete manipulation (Inhelder & Piaget, 1958). He/she can do mathematical calculations, think creatively, use abstract reasoning, and imagine the outcome of particular actions. An example of the distinction between concrete and formal operational stages is the answer to the question "If Kelly is taller than Ali and Ali is taller than Jo, who is tallest?" This is an example of **inferential reasoning**, which is the ability to think about things which the child has not actually experienced and to draw conclusions from its thinking. The child who needs to draw a picture or use objects is still in the concrete operational stage, whereas children who can reason the answer in their heads are using formal operational thinking.

Hypothetico-deductive reasoning: The ability to think scientifically through generating predictions, or hypotheses, about the world to answer questions is hypothetico-deductive reasoning. The individual will approach problems in a systematic and organized manner, rather than through trial-and-error.

Abstract Thought : Concrete operations are carried out on things whereas formal operations are carried out on ideas. The individual can think about hypothetical and abstract concepts they have yet to experience. Abstract thought is important for planning regarding the future.

How Did Piaget Test Formal Operations?

Piaget (1970) devised several tests of formal operational thought. One of the simplest was the 'third eye problem'. Children were asked

where they would put an extra eye, if they were able to have a third one, and why. Schaffer (1988) reported that when asked this question, 9-year-olds all suggested that the third eye should be on the forehead. However, 11-year-olds were more inventive, for example suggesting that a third eye placed on the hand would be useful for seeing round corners.

Formal operational thinking has also been tested experimentally using the pendulum task (Inhelder & Piaget, 1958). The method involved a length of string and a set of weights. Participants had to consider three factors (variables) the length of the string, the heaviness of the weight and the strength of push. The task was to work out which factor was most important in determining the speed of swing of the pendulum. Participants can vary the length of the pendulum string, and vary the weight. They can measure the pendulum speed by counting the number of swings per minute. To find the correct answer the participant has to grasp the idea of the experimental method -that is to vary one variable at a time e.g. trying different lengths with the same weight). A participant who tries different lengths with different weights is likely to end up with the wrong answer. Children in the formal operational stage approached the task systematically, testing one variable (such as varying the length of the string) at a time to see its effect. However, younger children typically tried out these variations randomly or changed two things at the same time. Piaget concluded that the systematic approach indicated the children were thinking logically, in the abstract, and could see the relationships between things. These are the characteristics of the formal operational stage.

Teenage thinking is characterized by the ability to reason logically and solve hypothetical problems such as how to design, plan, and build a structure.[17]

Critical Evaluation

Psychologists who have replicated this research, or used a similar problem, have generally found that children cannot complete the task successfully until they are older. Robert Siegler (1979) gave children a balance beam task in which some discs were placed either side of the center of balance[19].

In the balance-scale task, children have to predict the movement

17. Image by the Scott Air Force Base is in the public domain[19] McLeod, S. A. (2010, Dec 14) Formal operational stage. Retrieved from https://www.simplypsychology.org/formal-operational.html This work is licensed under a Creative Commons Attribution-Noncommercial-No Derivative Works 3.0 Unported License NC-ND-3.0 (modified by Marie Parnes)

of a balance-scale (see figure below), on which the number of blocks on each peg, and the distance between the blocks and the fulcrum are varied. Depending on the number of blocks and the distance between the blocks and the fulcrum on each arm, the beam tilts to one side or remains in balance. Thus, to succeed on the balance-scale task, a child has to identify the relevant task dimensions (number-of-blocks and distance) and to understand their multiplicative relation.
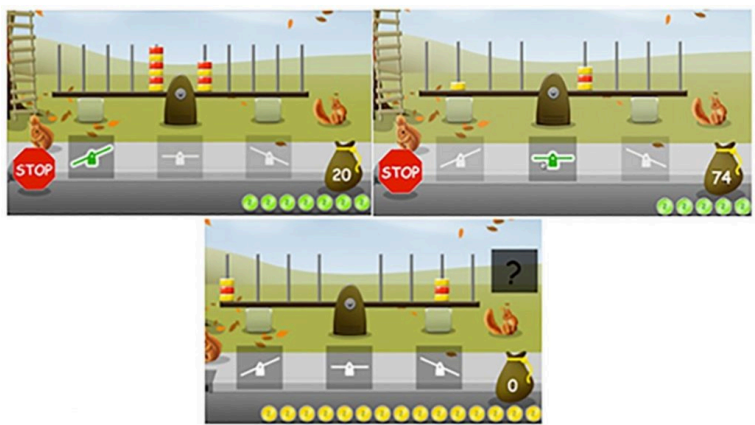
Three balance-scale tasks. The upper left-hand shows a conflict of weight, but the distance is the same, the upper right-hand corner shows a conflict between both weight and distance, but the scale will balance, and the lower example also shows a weight and distance conflict.

Using these item types Siegler differentiated between a series of rules that children might use to solve balance-scale items. A

child using Rule I will only consider the number of blocks in the prediction of the movement and disregards the distances—the number of blocks is more dominant than the distance. A child using Rule II does include the distance dimension in the prediction, but only when the number of blocks on each side of the fulcrum is equal. A child using Rule III does know that both the number-of-blocks and the distance dimension are relevant but does not know how to integrate both dimensions. A child using this rule will guess or 'muddle through' when both dimensions are in conflict. A child using Rule IV compares the torques on each side resulting in correct responses on all problems.[18]

Like Piaget, Siegler found that eventually the children were able to take into account the interaction between the weight of the discs and the distance from the center, and so successfully predict balance. However, this did not happen until participants were between 13 and 17 years of age. Consequently, Siegler concluded that children's cognitive development is based on acquiring and using rules in increasingly more complex situations, rather than in stages.[19]

18. Hofman, A. D., Visser, I., Jansen, B. R., & van der Maas, H. L. (2015). The Balance-Scale Task Revisited: A Comparison of Statistical Models for Rule-Based and Information-Integration Theories of Proportional Reasoning. *PloS one*, 10(10), e0136449. U.S National Library of Medicine. National Institutes of Health. Licensed under Public Domain.
19. McLeod, S. A. (2010, Dec 14) Formal operational stage. Retrieved from https://www.simplypsychology.org/formal-operational.html This work is licensed under a Creative Commons Attribution-Noncommercial-No Derivative Works 3.0 Unported License NC-ND-3.0 (modified by Marie Parnes)

Does everyone reach formal operations?

According to Piaget, most people attain some degree of formal operational thinking, but use formal operations primarily in the areas of their strongest interest (Crain, 2005). In fact, most adults do not regularly demonstrate formal operational thought. A possible explanation is that an individual's thinking has not been sufficiently challenged to demonstrate formal operational thought in all areas.

Adolescent Egocentrism

Once adolescents can understand abstract thoughts, they enter a world of hypothetical possibilities and demonstrate egocentrism, a heightened self-focus. The egocentricity comes from attributing unlimited power to their own thoughts (Crain, 2005). Piaget believed it was not until adolescents took on adult roles that they would be able to learn the limits to their own thoughts.

David Elkind (1967) expanded on the concept of Piaget's adolescent egocentricity. Elkind theorized that the physiological changes that occur during adolescence result in adolescents being primarily concerned with themselves. Additionally, since adolescents fail to differentiate between what others are thinking and their own thoughts, they believe that others are just as fascinated with their behavior and appearance. This belief results in the adolescent anticipating the reactions of others, and consequently constructing an **imaginary audience**. Elkind thought that the imaginary audience contributed to the self-consciousness that occurs during early adolescence. The desire for privacy and reluctance to share personal information may be a further reaction to feeling under constant observation by others. Alternatively, recent research has indicated that the imaginary audience is not Imaginary. Specifically, adolescents and adults feel that they are

often under scrutiny by others, especially if they are active on social media (Yau & Reich, 2018).

Another important consequence of adolescent egocentrism is the **personal fable** or belief that one is unique, special, and invulnerable to harm. Elkind (1967)   explains that because adolescents feel so important to others (imaginary audience) they regard themselves and their feelings as being special and unique. Adolescents believe that only they have experienced strong and diverse emotions, and therefore others could never understand how they feel. This uniqueness in one's emotional experiences reinforces the adolescent's belief of invulnerability, especially to death. Adolescents will engage in risky behaviors, such as drinking and driving or unprotected sex, and feel they will not suffer any negative consequences. Elkind believed that adolescent egocentricity emerged in early adolescence and declined in middle adolescence, however, recent research has also identified egocentricity in late adolescence (Schwartz, et al., 2008).

Consequences of Formal Operational Thought

As adolescents are now able to think abstractly and hypothetically, they exhibit many new ways of reflecting on information (Dolgin, 2011). For example, they demonstrate greater introspection or thinking about one's thoughts and feelings. They begin to imagine how the world could be which leads them to become idealistic or insisting upon high standards of behavior. Because of their idealism, they may become critical of others, especially adults in their life. Additionally, adolescents can demonstrate hypocrisy, or pretend to be what they are not. Since they are able to recognize what others expect of them, they will conform to those expectations for their emotions and behavior seemingly hypocritical to themselves. Lastly, adolescents can exhibit **pseudostupidity**. This is when they approach problems at a level that is too complex, and they fail because the tasks are too simple. Their new ability to consider

alternatives is not completely under control and they appear "stupid" when they are in fact bright, just not experienced.[20]

Beyond Formal Operational Thought

As with other major contributors of theories of development, several of Piaget's ideas have come under criticism based on the results of further research. For example, several contemporary studies support a model of development that is more continuous than Piaget's discrete stages (Courage & Howe, 2002; Siegler, 2005, 2006). Many others suggest that children reach cognitive milestones earlier than Piaget describes (Baillargeon, 2004; de Hevia & Spelke, 2010).

According to Piaget, the highest level of cognitive development is formal operational thought, which develops between 11 and 20 years old. However, many developmental psychologists disagree with Piaget, suggesting a fifth stage of cognitive development, known as the **postformal stage** (Basseches, 1984; Commons & Bresette, 2006; Sinnott, 1998). In postformal thinking, decisions are made based on situations and circumstances, and logic is integrated with emotion as adults develop principles that depend on contexts. One way that we can see the difference between an adult in postformal thought and an adolescent in formal operations is in terms of how they handle emotionally charged issues.

It seems that once we reach adulthood our problem-solving abilities change: As we attempt to solve problems, we tend to think more deeply about many areas of our lives, such as relationships, work, and politics (Labouvie-Vief & Diehl, 1999). Because of this, postformal thinkers can draw on past experiences to help them solve new problems. Problem-solving strategies using postformal

thought vary, depending on the situation. What does this mean? Adults can recognize, for example, that what seems to be an ideal solution to a problem at work involving a disagreement with a colleague may not be the best solution to a disagreement with a significant other.[21]

Vygotsky's Sociocultural Theory of Cognitive Development

As introduced in Chapter 1, Lev Vygotsky was a Russian psychologist who argued that culture has a major impact on a child's cognitive development. He believed that the social interactions with adults and more interpersonal instruction, he believed children's minds would not advance very far as their knowledge would be based only on their own discoveries. Let's review some of Vygotsky's key concepts. Some of Vygotsky's key concepts are described below. [22]

Zone of Proximal Development: Vygotsky believed that learning takes place within the Zone of Proximal Development (ZPD). In this, students can, with help from adults or children who are more advanced, master concepts and ideas that they cannot understand on their own. This model has two developmental   levels:

1. The **level of actual development** – point the learner has already reached & can problem-solve independently.

21. LibreTexts Social Science, "Cognitive Theory of Development," is licensed under CC BY NC SA 3.0
22. Lifespan Development - Module 5: Early Childhood by Lumen Learning references Psyc 200 Lifespan Psychology by Laura Overstreet, licensed under CC BY 4.0

2. The **level of potential development** – point the learner is capable of reaching under the guidance of teachers or in collaboration with peers.

The **zone of proximal development** (ZPD) is the level at which learning takes place. It comprises cognitive structures that are still in the process of maturing, but which can only mature under the guidance of or in collaboration with others.

ZPD is the gap between what the student is currently capable of doing independently, and what they can do with support.
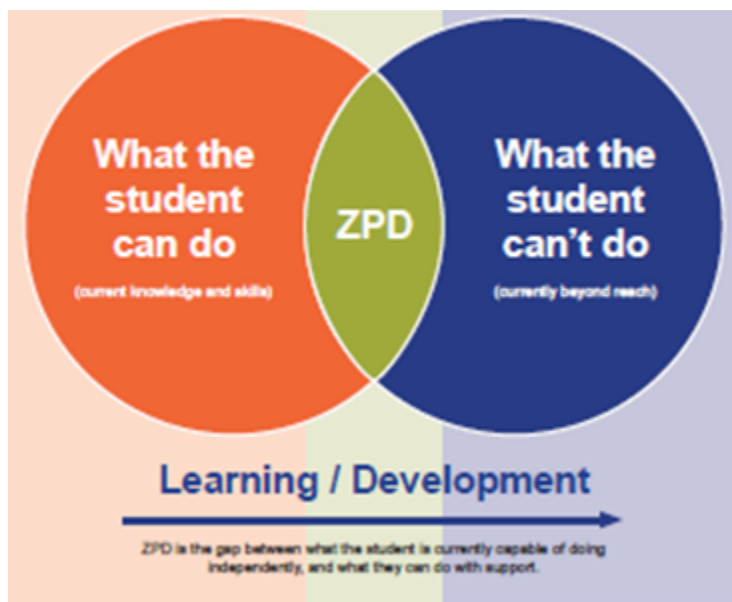
The ZPD is the gap between what the student is currently capable of doing independently and what they can do with support.[23]

To ensure development in the ZPD, the assistance/guidance received must have certain features:

Intersubjectivity – the process whereby two participants who begin a task with different understandings arrive at a shared understanding (Newson & Newson, 1975). This creates a common ground for communication as each partner adjusts to the perspective of the other.

Scaffolding – adjusting the support offered during a teaching session to fit the child's current level of performance. This captures the form of teaching interaction that occurs as individuals work on tasks such as puzzles and academic assignments.[24]

Guided participation – a broader concept than scaffolding that refers to shared endeavors between expert and less expert participants

Private Speech: Do you ever talk to yourself? Why? Chances are, this occurs when you are struggling with a problem, trying to remember something, or feel very emotional about a situation. Children talk to themselves too. Piaget interpreted this as egocentric speech *or speech that is focused on the child and does not include another's point of view.* Vygotsky, however, believed that children talk to themselves in order to solve problems or clarify thoughts. As children learn to think in words, they do so aloud before eventually closing their lips and engaging in private speech *or* **inner speech**. Thinking out loud eventually becomes thought accompanied by internal speech and talking to oneself becomes a practice only engaged in when we are trying to learn something or remember something. This inner speech is not as elaborate as the speech we use when communicating with others (Vygotsky, 1962).[25]

23. iea website. Used under copyright privileges as stated on SACE Board Copyright and Intellectual Property Policy.
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25. Lifespan Development - Module 5: Early Childhood by Lumen

Contrast with Piaget: Piaget was highly critical of teacher-directed instruction believing that teachers who take control of the child's learning place the child into a passive role (Crain, 2005). Further, teachers may present abstract ideas without the child's true understanding, and instead they just repeat back what they heard. Piaget believed children must be given opportunities to discover concepts on their own. As previously stated, Vygotsky did not believe children could reach a higher cognitive level without instruction from more learned individuals. Who is correct? Both theories certainly contribute to our understanding of how children learn.[28]

Information Processing Theory

Information Processing is not the work of a single theorist but based on the ideas and research of several cognitive scientists studying how individuals perceive, analyze, manipulate, use, and remember information. This approach assumes that humans gradually improve in their processing skills; that is, cognitive development is continuous rather than stage-like. The more complex mental skills of adults are built from the primitive abilities of children. We are born with the ability to notice stimuli, store, and retrieve information, and brain maturation enables advancements in our information processing system. At the same time, interactions with

the environment also aid in our development of more effective strategies for processing information.[26]

Attention

Changes in attention have been described by many as the key to changes in human memory (Nelson & Fivush, 2004; Posner & Rothbart, 2007). However, attention is not a unified function; it is comprised of sub-processes. The ability to switch our focus between tasks or external stimuli is called **divided attention** or **multitasking**. This is separate from our ability to focus on a single task or stimulus, while ignoring distracting information, called **selective attention**. Different from these is **sustained attention**, or the ability to stay on task for long periods of time. Moreover, we also have attention processes that influence our behavior and enable us to inhibit a habitual or dominant response, and others that enable us to distract ourselves when upset or frustrated.[27]

Attention in Infancy

An approach to understanding cognitive development by observing the behavior of infants is through the use of the **habituation technique**, which was discussed in detail in Chapter 2, Research

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methods. You should recall that habituation refers to the decreased responsiveness toward a stimulus after it has been presented numerous times in succession. Organisms including infants, tend to be more interested in things the first few times they experience them and become less interested in them with more frequent exposure. Developmental psychologists have used this general principle to help them understand what babies remember and understand. Although this procedure is very simple, it allows researchers to create variations that reveal a great deal about a newborn's cognitive ability.[28]

The results of visual habituation research and the findings from other studies that measured attention utilizing other measures (e.g., looking measures such as the visual paired comparison task, heart rate, and event-related potentials) indicate significant developmental change in **sustained attention** and **selective attention** across the infancy period. For example, infants show gains in the magnitude of the attention related response and spend a greater proportion of time engaged in attention with increasing age (Richards and Turner, 2001). Throughout infancy, attention has a significant impact on infant performance on a variety of tasks tapping into recognition memory.[29]

28. Introduction to Psychology - 1st Canadian Edition by Jennifer Walinga and Charles Stangor is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License, except where otherwise noted (modified by Marie Parnes)
29. Reynolds GD and Romano AC (2016) The Development of Attention Systems and Working Memory in Infancy. Front. Syst. Neurosci. https://doi.org/10.3389/fnsys.2016.00015 is licensed under Creative Commons Attribution License (CC BY 4.0). (modified by Marie Parnes)[33] Lifespan Development: A Psychological Perspective 2nd Edition by Martha Lally and Suzanne Valentine-French is licensed under CC BY-NC-SA 3.0

Attention in Childhood

Divided Attention: Young children (age 3-4) have considerable difficulties in dividing their attention between two tasks, and often perform at levels equivalent to our closest relative, the chimpanzee, but by age five they have surpassed the chimp (Hermann, Misch, Hernandez-Lloreda & Tomasello, 2015; Hermann & Tomasello, 2015). Despite these improvements, 5-year-olds continue to perform below the level of school-age children, adolescents, and adults. Older children also improve in their ability to shift their attention between tasks or different features of a task (Carlson, Zelazo, & Faja, 2013). A younger child who asked to sort objects into piles based on type of object, car versus animal, or color of object, red versus blue, may have difficulty if you switch from asking them to sort based on type to now having them sort based on color. This requires them to suppress the prior sorting rule. An older child has less difficulty making the switch, meaning there is greater flexibility in their attentional skills. These changes in attention and working memory contribute to children having more strategic approaches to tasks.

Selective Attention: Children's ability with selective attention tasks improve as they age. However, this ability is also greatly influenced by the child's temperament (Rothbart & Rueda, 2005), the complexity of the stimulus or task (Porporino, Shore, Iarocci & Burack, 2004), and along with whether the stimuli are visual or auditory (Guy, Rogers & Cornish, 2013). Guy et al. found that children's ability to selectively attend to visual information outpaced that of auditory stimuli. This may explain why young children are not able to hear the voice of the teacher over the cacophony of sounds in the typical preschool classroom (Jones, Moore & Amitay, 2015). Jones and his colleagues found that 4 to 7-year-olds could not filter out background noise, especially when its frequencies were close in sound to the target sound. In comparison, 8 to 11-year-old older children often performed similar to adults. Overall, the

ability inhibit irrelevant information improves during this age group, with there being a sharp improvement in selective attention from age six into adolescence (Vakil, Blachstein, Sheinman, & Greenstein, 2009).[33]

Sustained Attention: Most measures of sustained attention typically ask children to spend several minutes focusing on one task, while waiting for an infrequent event, while there are multiple distractors for several minutes. Berwid, Curko-Kera, Marks and Halperin (2005) asked children between the ages of 3 and 7 to push a button whenever a "target" image was displayed, but they had to refrain from pushing the button when a non-target image was shown. The younger the child, the more difficulty he or she had maintaining their attention. [30]

Disorders Involving Attention

Attention Deficit/Hyperactivity Disorder (AD/HD)

The exact causes of **attention deficit/hyperactivity disorder** (AD/HD) are unknown; however, research has demonstrated that factors that many people associate with the development of AD/HD do not cause the disorder including, minor head injuries, damage to the brain from complications during birth, food allergies, excess sugar intake, too much television, poor schools, or poor parenting. Research has found a number of significant risk factors affecting neurodevelopment and behavior expression. Events such as maternal alcohol and tobacco use that affect the development of

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the fetal brain can increase the risk for AD/HD. Injuries to the brain from environmental toxins such as lack of iron have also been implicated.

Symptoms: People with AD/HD show a persistent pattern of inattention and/or hyperactivity–impulsivity that interferes with functioning or development:

Inattention: Six or more symptoms of inattention for children up to age 16, or five or more for adolescents 17 and older and adults; symptoms of inattention have been present for at least 6 months, and they are inappropriate for developmental level:

1. .Often fails to give close attention to details or makes careless mistakes in schoolwork, at work, or with other activities.
2. Often has trouble holding attention on tasks or play activities.
3. Often does not seem to listen when spoken to directly.
4. Often does not follow through on instructions and fails to finish schoolwork, chores, or duties in the workplace (e.g., loses focus, side-tracked).
5. Often has trouble organizing tasks and activities.
6. Often avoids, dislikes, or is reluctant to do tasks that require mental effort over a long period of time (such as schoolwork or homework).
7. Often loses things necessary for tasks and activities (e.g. school materials, pencils, books, tools, wallets, keys, paperwork, eyeglasses, mobile telephones).
8. Is often easily distracted
9. Is often forgetful in daily activities.

2. Hyperactivity and Impulsivity: Six or more symptoms of hyperactivity-impulsivity for children up to age 16, or five or more for adolescents 17 and older and adults; symptoms of hyperactivity-impulsivity have been present for at least 6 months to an extent that is disruptive and inappropriate for the person's developmental level:

1. Often fidgets with or taps hands or feet, or squirms in seat.
2. Often leaves seat in situations when remaining seated is expected.
3. Often runs about or climbs in situations where it is not appropriate (adolescents or adults may be limited to feeling restless).
4. Often unable to play or take part in leisure activities quietly.
5. Is often "on the go" acting as if "driven by a motor".
6. Often talks excessively.
7. Often blurts out an answer before a question has been completed.
8. Often has trouble waiting his/her turn.
9. Often interrupts or intrudes on others (e.g., butts into conversations or games

In addition, the following conditions must be met:

1. Several inattentive or hyperactive-impulsive symptoms were present before age 12 years.
2. Several symptoms are present in two or more settings, (such as at home, school or work; with friends or relatives; in other activities).
3. There is clear evidence that the symptoms interfere with, or reduce the quality of, social, school, or work functioning.
4. The symptoms are not better explained by another mental disorder (such as a mood disorder, anxiety disorder, dissociative disorder, or a personality disorder). The symptoms do not happen only during the course of schizophrenia or another psychotic disorder.

    Based on the types of symptoms, three kinds (presentations) of AD/HD can occur:
    AD/HD Combined Presentation: if enough symptoms of both

criteria inattention and hyperactivity-impulsivity were present for the past six months.

Predominantly Inattentive Presentation: if enough symptoms of inattention, but not hyperactivity-impulsivity, were present for the past six months: if enough symptoms of hyperactivity-impulsivity, but not inattention, were present for the past six months.

Predominantly Hyperactive-Impulsive Presentation: if enough symptoms of hyperactivity-impulsivity, but not inattention, were present for the past six months.

Because symptoms can change over time, the presentation may change over time as well.[31]

The diagnosis of AD/HD can be made reliably using well-tested diagnostic interview methods. However, as of yet, there is no independent valid test for ADHD. Among children, AD/HD frequently occurs along with other learning, behavior, or mood problems such as learning disabilities, oppositional defiant disorder, anxiety disorders, and depression.

Treatment

A variety of medications and behavioral interventions are used to treat AD/HD. The most widely used medications are methylphenidate (Ritalin), D-amphetamine, and other amphetamines. These drugs are stimulants that affect the level of the neurotransmitter dopamine at the synapse. Nine out of 10 children improve while taking one of these drugs. In addition to the well-established treatments described above, some parents and therapists have tried a variety of nutritional interventions to treat AD/HD. A few studies have found that some children benefit from such treatments. Nevertheless, no well-established nutritional

31. Symptoms and Diagnosis of ADHD by the CDC is in the public domain.

interventions have consistently been shown to be effective for treating AD/HD.[32]

Memory

One way of understanding memory is to think about it in terms of stages that describe the length of time that information remains available to us. According to this approach information begins in **sensory memory**, moves to **short-term memory**, and eventually moves to **long-term memory**. But not all information makes it through all three stages; most of it is forgotten. Whether the information moves from shorter-duration memory into longer-duration memory or whether it is lost from memory entirely depends on how the information is attended to and processed.[33]

Milti-Store Model of Memory[38]

MULTI-STORE MODEL

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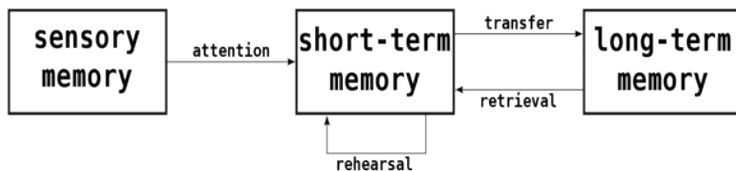
32. Disease Prevention and Healthy Lifestyles by Judy Baker, Ph.D. is licensed under CC BY-SA.
33. *Introduction to Psychology – 1st Canadian Edition by Jennifer Walinga and Charles Stangor is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License, except where otherwise noted (modified by Marie Parnes)*[38] This image is made available under the Creative Commons CC0 1.0 Universal Public Domain Dedication

Sensory memory: refers to the brief storage of sensory information. Sensory memory is a memory buffer that lasts only very briefly and then, unless it is attended to and passed on for more processing, is forgotten. The purpose of sensory memory is to give the brain some time to process the incoming sensations, and to allow us to see the world as an unbroken stream of events rather than as individual pieces.

Visual sensory memory is known as **iconic memory**. Iconic memory was first studied by the psychologist George Sperling (1960).Sperling, G. (1960). The information is available in a brief visual presentation. In his research, Sperling showed participants a display of letters in rows (see image below). However, the display lasted only about 50 milliseconds (1/20 of a second). Then, Sperling gave his participants a recall test in which they were asked to name all the letters that they could remember. On average, the participants could remember only about one-quarter of the letters that they had seen.
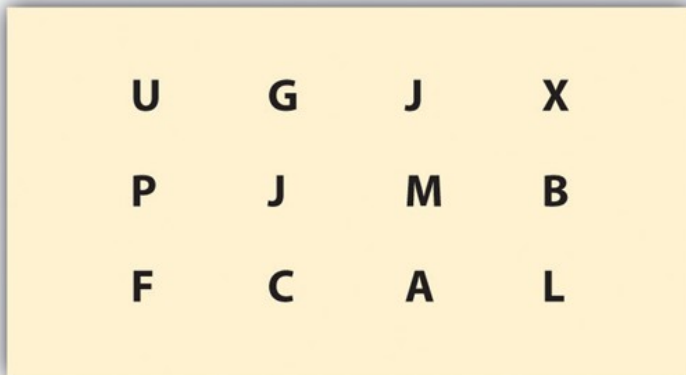
Sperling (1960) showed his participants displays such as this one for only 1/20th of a second. He found that when he cued the participants to report one of the three rows of letters, they could do it, even if the cue was given shortly after the display had been removed. The research demonstrated the existence of iconic memory.

Sperling reasoned that the participants had seen all the letters but could remember them only very briefly, making it impossible for them to report them all. To test this idea, in his next experiment he first showed the same letters, but then after the display had been removed, he signaled to the participants to report the letters from either the first, second, or third row. In this condition, the participants now reported almost all the letters in that row. This finding confirmed Sperling's hunch: Participants had access to all of the letters in their iconic memories, and if the task was short enough, they were able to report on the part of the display he asked them to. The "short enough" is the length of iconic memory, which turns out to be about 250 milliseconds (¼ of a second).

Auditory sensory memory is known as **echoic memory**. In contrast to iconic memories, which decay very rapidly, echoic memories can last as long as 4 seconds (Cowan, Lichty, & Grove, 1990).Cowan, N., Lichty, W., & Grove, T. R. 1990).

In some people iconic memory seems to last longer, a phenomenon known as **eidetic imagery** (or "photographic

34. "Memories as Types and Stages" from Beginning Psychology (v. 1.0) by Charles Stanger is licensed under CC BY-NC-SA 3.0 (modified by Marie Parnes)

memory") in which people can report details of an image over long periods of time. These people, who often suffer from psychological disorders such as autism, claim that they can "see" an image long after it has been presented, and can often report accurately on that image. There is also some evidence for eidetic memories in hearing; some people report that their echoic memories persist for unusually long periods of time. The composer Wolfgang Amadeus Mozart may have possessed eidetic memory for music, because even when he was very young and had not yet had a great deal of musical training, he could listen to long compositions and then play them back almost perfectly (Solomon, 1995).

Most of the information that gets into sensory memory is forgotten, but information that we turn our attention to, with the goal of remembering it, may pass into *short-term memory*. **Short-term memory (STM)** is *the place where small amounts of information can be temporarily kept for more than a few seconds but usually for less than one minute (Baddeley, Vallar, & Shallice, 1990)*. Information in short-term memory is not stored permanently but rather becomes available for us to process, and the processes that we use to make sense of, modify, interpret, and store information in STM are known as **working memory**. Short-term memory is limited in its capacity. The digit span of most adults is between five and nine digits, with an average of about seven. (George Miller, 1956).

If information makes it past short term-memory it may enter **long-term memory (LTM)**, *memory storage that can hold information for days, months, and years*. The capacity of long-term memory is large, and there is no known limit to what we can remember (Wang, Liu, & Wang, 2003). **Explicit memory** refers to knowledge or experiences that can be consciously remembered. There are two types of explicit memory: **episodic memory** and **semantic memory**. Episodic memory refers to the firsthand experiences that we have had (e.g., recollections of our high school graduation day or of the fantastic dinner we had in New York last year). Semantic memory refers to our *knowledge of facts and concepts about the* world (e.g., that the absolute value of −90 is

greater than the absolute value of 9 and that one definition of the word "affect" is "the experience of feeling or emotion").In contrast, knowing how to walk so you can get to the classroom or how to hold a pencil to write would be examples of non-declarative memories.[35]

Types of Long Term Memory [36]

While explicit memory consists of the things that we can consciously report that we know, **implicit memory** refers to knowledge that we cannot consciously access. However, implicit memory is nevertheless exceedingly important to us because it has a direct effect on our behavior. Implicit memory refers to the influence of experience on behavior, even if the individual is not aware of those influences. As you can see in the figure "Types

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35. "Memories as Types and Stages" from Beginning Psychology (v. 1.0) by Charles Stangor is licensed under CC BY-NC-SA 3.0 (modified by Marie Parnes)
36. Image retrieved from "Memories as Types and Stages" from Beginning Psychology (v. 1.0) by Charles Stangor is licensed under CC BY-NC-SA 3.0

of Memory", there are three general types of implicit memory: **procedural memory**, **classical conditioning effects**, and **priming**.

Procedural memory refers to our often-unexplainable knowledge of how to do things. When we walk from one place to another, speak to another person   in English, dial a cell phone, or play a video game, we are using procedural memory. Procedural memory allows us to perform complex tasks, even though we may not be able to explain to others how we do them. There is no way to tell someone how to ride a bicycle; a person has to learn by doing it. The idea of implicit memory helps explain how infants are able to learn. The ability to crawl, walk, and talk are procedures, and these skills are easily and efficiently developed while we are children despite the fact that as adults we have no conscious memory of having learned them.

A second type of implicit memory is **classical conditioning effects**, in which we learn, often without effort or awareness, to associate neutral stimuli (such as a sound or a light) with another stimulus (such as food), which creates a naturally occurring response, such as enjoyment or salivation. The memory for the association is demonstrated when the conditioned stimulus (the sound) begins to create the same response as the unconditioned stimulus (the food) did before the learning.

The final type of implicit memory is known as **priming**, or changes in behavior as a result of experiences that have happened frequently or recently. Priming refers both to the activation of knowledge (e.g., we can prime the concept of "kindness" by presenting people with words related to kindness) and to the influence of that activation on behavior (people who are primed with the concept of kindness may act more kindly).[37]
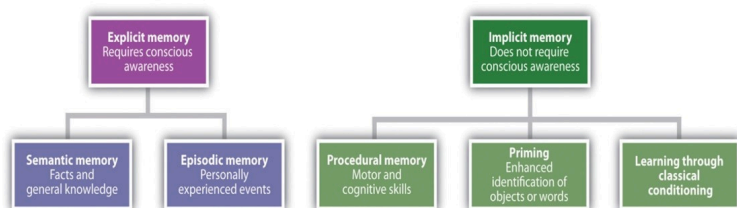
37. "Memories as Types and Stages" from Beginning Psychology (v. 1.0) by Charles Stangor is licensed under CC BY-NC-SA 3.0 (modified by Marie Parnes)

Connectionism and Network Models

Network models of memory storage emphasize the role of connections between stored memories in the brain. The basis of these theories is that neural networks connect and interact to store memories by modifying the strength of the connections between neural units. In network theory, each connection is characterized by a weight value that indicates the strength of that particular connection. The stronger the connection, the easier a memory is to retrieve.

   Network models are based on the concept of **connectionism**. Connectionism is an approach in cognitive science that models mental or behavioral phenomena as the emergent processes of interconnected networks that consist of simple units. Connectionism was introduced in the 1940s by Donald Hebb, who said the famous phrase, "Cells that fire together wire together." This is the key to understanding network models: neural units that are activated together strengthen the connections between themselves.

   There are several types of network models in memory research. Some define the fundamental network unit as a piece of information. Others define the unit as a neuron. However, network models generally agree that memory is stored in neural networks and is strengthened or weakened based on the connections between neurons. Network models are not the only models of memory storage, but they do have a great deal of power when it comes to explaining how learning memory work in the brain, so they are extremely important to understand.[38]

38. Connectionism. Provided by: Wikipedia. Located at. https://en.wikipedia.org/wiki/Connectionism License: CC BY-SA: Attribution-ShareAlike. Curation and Revision. by Boundless.com. License: CC BY-SA Attribution Share A like.[44] This file made
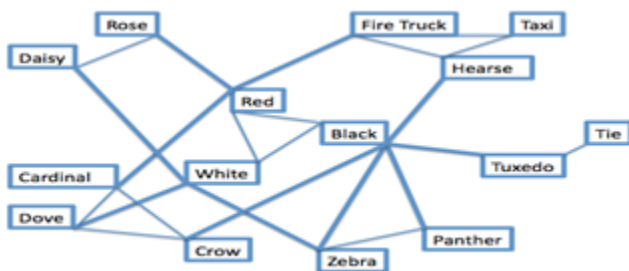
An example of a neural network. The darker lines demonstrate a stronger connection between concepts whereas the lighter lines represent a weaker connection between concepts. [44]

Infant Memory

Infant Memory requires a certain degree of brain maturation, so it should not be surprising that infant memory is rather fleeting and fragile. As a result, older children and adults experience **infantile amnesia**, the inability to recall memories from the first few years of life. Several hypotheses have been proposed for this amnesia. From the biological perspective, it has been suggested that infantile amnesia is due to the immaturity of the infant brain, especially those areas that are crucial to the formation of autobiographical

memory, such as the hippocampus. From the cognitive perspective, it has been suggested that the lack of linguistic skills of babies and toddlers limit their ability to mentally represent events; thereby, reducing their ability to encode memory. Moreover, even if infants do form such early memories, older children and adults may not be able to access them because they may be employing very different, more linguistically based, retrieval cues than infants used when forming the memory. Finally, social theorists argue that episodic memories of personal experiences may hinge on an understanding of "self", something that is clearly lacking in infants and young toddlers.

However, in a series of clever studies Carolyn Rovee-Collier and her colleagues have demonstrated that infants can remember events from their life, even if these memories are short-lived. Three-month-old infants were taught that they could make a mobile hung over their crib shake by kicking their legs. The infants were in their crib, on their backs. A ribbon was tied to one foot and the other end to a mobile. At first infants made random movements, but then came to realize that by kicking they could make the mobile shake. After two 9 minute sessions with the mobile, the mobile was removed. One week later the mobile was reintroduced to one group of infants and most of the babies immediately started kicking their legs, indicating that they remembered their prior experience with the mobile. A second group of infants was shown the mobile two weeks later and the babies only random movements. The memory had faded (Rovee-Collier, 1987; Giles & Rovee-Collier, 2011). Rovee-Collier and Hayne (1987) found that 3-month-olds could remember the mobile after two weeks if they were shown the mobile and watched it move, even though they were not tied to it. This reminder helped most infants to remember the connection between their kicking and the movement of the mobile. Like many researchers of infant memory, Rovee-Collier (1990) found infant memory to be very context dependent. In other words, the sessions with the mobile and the later retrieval sessions had to be conducted under very similar circumstances or else the babies would not

remember their prior experiences with the mobile. For instance, if the first mobile had had yellow blocks with blue letters, but at the later retrieval session the blocks were blue with yellow letters, the babies would not kick.

Infants older than 6 months of age can retain information for longer periods of time; they also need less reminding to retrieve information in memory. Studies of Deferred Imitation, that is, the imitation of actions after a time delay, can occur as early as six-months of age (Campanella & Rovee-Collier, 2005), but only if infants are allowed to practice the behavior they were shown. By 12 months of age, infants no longer need to practice the behavior in order to retain the memory for four weeks (Klein & Meltzoff, 1999).[39]

Memory in Early Childhood

As mentioned earlier in this chapter, three types of memory have been identified: sensory memory, short term memory (working memory) and long-term memory.

Sensory Memory: Studies of auditory sensory memory have found that the sensory memory trace for the characteristics of a tone last about one second in 2-year-olds, two seconds in 3-year-olds, more than two seconds in 4-year-olds and three to five seconds in 6-year-olds (Glass, Sachse, & vob Suchodoletz, 2008). Other researchers have found that young children hold sounds for a shorter duration than do older children and adults and that this deficit is not due attentional differences between these age groups

39. **Authored by**: Martha Lally and Suzanne Valentine-French. **Provided by**: College of Lake County Foundation. **Locate at**: **http://dept.clcillinois.edu/psy/ LifespanDevelopment.pdf**. **License**: *CC BY-NC-SA: Attribution-NonCommercial-ShareAlike*

but reflect differences in the performance of the sensory memory system (Gomes et al., 1999).

Short-term Memory: Children in this age group struggle with many aspects of attention, and this greatly diminishes their ability to consciously juggle several pieces of information in memory. The capacity of working memory, that is the amount of information someone can hold in consciousness, is smaller in young children than in older children and adults (Galotti, 2018). The typical adult and teenager can hold a 7-digit number active in their short-term memory. The typical 5-year-old can hold only a 4-digit number active. This means that the more   complex a mental task is, the less efficient a younger child will be in paying attention to, and actively processing, information in order to complete the task.

Older children and adults use mental strategies to aid their memory performance. For instance, simple rote rehearsal may be used to commit information to memory. Young children often do not rehearse unless reminded to do so, and when they do rehearse, they often fail to use **clustering rehearsal**. In clustering rehearsal**,** *the person rehearses previous material while adding in additional information.* If a list of words is read out loud to you, you are likely to rehearse each word as you hear it along with any previous words you were given. Young children will repeat each word they hear, but often fail to repeat the prior words in the list. In Schneider, Kron-Sperl and Hunnerkopf's (2009) longitudinal study of kindergarten children, the majority of children used no strategy to remember information, a finding that was consistent with previous research. As a result, their memory performance was poor when compared to their abilities as they aged and started to use more effective memory strategies.

Long-term Memory: A component of episodic memory is **autobiographical memory** *or our personal narrative.* Adults rarely remember events from the first few years of life. In other words, we lack autobiographical memories from our experiences as an infant, toddler and very young preschooler. Several factors contribute to the emergence of autobiographical memory, including brain

maturation, improvements in language, opportunities to talk about experiences with parents and others, the development of theory of mind, and a representation of "self" (Nelson & Fivush, 2004). Two-year-olds do remember fragments of personal experiences, but these are rarely coherent accounts of past events (Nelson & Ross, 1980). Between 2 and 2 ½ years of age children can provide more information about past experiences. However, these recollections require considerable prodding by adults (Nelson & Fivush, 2004). Over the next few years, children will form more detailed autobiographical memories and engage in more reflection of the past.

Neo-Piagetians

As previously discussed, Piaget's theory has been criticized on many fronts, and updates to reflect more current research have been provided by the **Neo-Piagetians**, *or those theorists who provide "new" interpretations of Piaget's theory*. Morra, Gobbo, Marini and Sheese (2008) reviewed Neo-Piagetian theories, which were first presented in the 1970s, and identified how these "new" theories combined Piagetian concepts with those found in Information Processing. Similar to Piaget's theory, Neo-Piagetian theories believe in **constructivism**, assume cognitive development can be separated into different stages with qualitatively different characteristics, and advocate that children's thinking becomes more complex in advanced stages. Unlike Piaget, Neo-Piagetians believe that aspects of information processing change the complexity of each stage, not logic as determined by Piaget.

Neo-Piagetians propose that working memory capacity is affected by biological maturation, and therefore restricts young children's ability to acquire complex thinking and reasoning skills. Increases in working memory performance and cognitive skills development coincide with the timing of several

neurodevelopmental processes. These include **myelination**, **axonal pruning**, **synaptic pruning**, changes in cerebral metabolism, and changes in brain activity (Morra et al., 2008). Myelination especially occurs in waves between birth and adolescence, and the degree of myelination in particular areas explains the increasing efficiency of certain skills. Therefore, brain maturation, which occurs in spurts, affects how and when cognitive skills develop. Additionally, all Neo-Piagetian theories support that experience and learning interact with biological maturation in shaping cognitive development.[40]

Memory in Middle-to-Late Childhood

Children differ in their memory abilities, and these differences predict both their readiness for school and academic performance in school (PreBler, Krajewski, & Hasselhorn, 2013). During middle and late childhood children make strides in several areas of cognitive function including the capacity of working memory, ability to pay attention, and their use of memory strategies. Both changes in the brain and experience foster these abilities.

Working Memory: The capacity of working memory expands during middle and late childhood, and research has suggested that both an increase in processing speed and the ability to inhibit irrelevant information from entering memory are contributing to the greater efficiency of working memory during this age (de Ribaupierre, 2002). Changes in myelination and synaptic pruning in

40. Lifespan Development: A Psychological Perspective 2nd Edition by Martha Lally and Suzanne Valentine-French is licensed under CC BY-NC-SA 3.0 (modified by Marie Parnes)[47]   Lifespan Development: A Psychological Perspective 2nd Edition by Martha Lally and Suzanne Valentine-French is licensed under CC BY-NC-SA 3.0 (modified by Marie Parnes)

the cortex are likely behind the increase in processing speed and ability to filter out irrelevant stimuli (Kail, McBride-Chang, Ferrer, Cho, & Shu, 2013).

Children with learning disabilities in math and reading often have difficulties with working memory (Alloway, 2009). They may struggle with following the directions of an assignment. When a task calls for multiple steps, children with poor working memory may miss steps because they may lose track of where they are in the task. Adults working with such children may need to communicate: Using more familiar vocabulary, using shorter sentences, repeating task instructions more frequently, and breaking more complex tasks into smaller more manageable steps. Some studies have also shown that more intensive training of working memory strategies, such as chunking, aid in improving the capacity of working memory in children with poor working memory (Alloway, Bibile, & Lau, 2013).

Memory Strategies

Bjorklund (2005) describes a developmental progression in the acquisition and use of memory strategies. Such strategies are often lacking in younger children but increase in frequency as children progress through elementary school. Examples of memory strategies or **mnemonics**, include rehearsing information you wish to recall, visualizing and organizing information, creating rhymes, such "i" before "e" except after "c", or inventing acronyms, such as "roygbiv" to remember the colors of the rainbow. Schneider, Kron-Sperl, and Hünnerkopf (2009) reported a steady increase in the use of memory strategies from ages six to ten in their longitudinal study. Moreover, by age ten many children were using two or more memory strategies to help them recall information. Schneider and colleagues found that there were considerable individual differences at each age in the use of strategies, and that children who utilized more strategies had better memory performance than

their same aged peers. Children may experience deficiencies in their use of memory strategies. A **mediation deficiency** *occurs when a child does not grasp the strategy being taught, and thus, does not benefit from its use.* If you do not understand why using an acronym might be helpful, or how to create an acronym, the strategy is not likely to help you. In a **production deficiency** *the child does not spontaneously use a memory strategy and must be prompted to do so.* In this case, children know the strategy and are more than capable of using it, but they fail to "produce" the strategy on their own. For example, children might know how to make a list, but may fail to do this to help them remember what to bring on a family vacation. A **utilization deficiency** *refers to children using an appropriate strategy, but it fails to aid their performance.* Utilization deficiency is common in the early stages of learning a new memory strategy (Schneider & Pressley, 1997; Miller, 2000). Until the use of the strategy becomes automatic it may slow down the learning process, as space is taken up in memory by the strategy itself. Initially, children may get frustrated because their memory performance may seem worse when they try to use the new strategy. Once children become more adept at using the strategy, their memory performance will improve. Sodian and Schneider (1999) found that new memory strategies acquired prior to age eight often show utilization deficiencies with there being a gradual improvement in the child's use of the strategy. In contrast, strategies acquired after this age often followed an "all-or-nothing" principle in which improvement was not gradual, but abrupt. [47]

Knowledge Base (Long-term memory)

One's **knowledge base memory** has an unlimited capacity and stores information for days, months or years. It consists of things that we know of or can remember if asked. This is where you want information to ultimately be stored. The important thing to

remember about storage is that it must be done in a meaningful or effective way. In other words, if you simply try to repeat something several times in order to remember it, you may only be able to remember the sound of the word rather than the meaning of the concept. So if you are asked to explain the meaning of the word or to apply a concept in some way, you will be lost. Studying involves organizing information in a meaningful way for later retrieval. Passively reading a text is usually inadequate and should be thought of as the first step in learning material. Writing key words, thinking of examples to illustrate their meaning, and considering ways that concepts are related are all techniques helpful for organizing information for effective storage and later retrieval.

During middle childhood, children are able to learn and remember due to an improvement in the ways they attend to and store information. As children enter school and learn more about the world, they develop more categories for concepts and learn more efficient strategies for storing and retrieving information. One significant reason is that they continue to have more experiences on which to tie new information. New experiences are similar to old ones or remind the child of something else about which they know. This helps them file away new experiences more easily.

They also have a better understanding of how well they are performing on a task and the level of difficulty of a task. As they become more realistic about their abilities, they can adapt studying strategies to meet those needs. While preschoolers may spend as much time on an unimportant aspect of a problem as they do on the main point, school aged children start to learn to prioritize and gage what is significant and what is not. They develop metacognition or the ability to understand the best way to figure out a problem. They gain more tools and strategies (such as "i before e except after c" so they know that "receive" is correct but "recieve" is not.)[41]

41. Lifespan Development - Module 6: Middle Childhood by Lumen

Executive Function

Executive function is an umbrella term for the management, regulation, and control of cognitive processes, including working memory, reasoning, problem solving, social inhibition, planning, and execution. The **executive system** is a theoretical cognitive system that manages the processes of executive function. This system is thought to rely on the prefrontal areas of the frontal lobe, but while these areas are necessary for executive function, they are not solely sufficient.

Role of the Executive System

The executive system is thought to be heavily involved in handling novel situations outside the domain of the routine, automatic psychological processes (i.e., ones that are handled by learned schemas or set behaviors). There are five types of situation where routine behavior is insufficient for optimal performance, in which the executive system comes into play:

- planning or decision making;
- error correction or troubleshooting;
- novel situations with unrehearsed reactions;
- dangerous or technically difficult situations;
- overcoming of a strong habitual response; resisting temptation.

A prepotent response is a response for which immediate reinforcement (positive or negative) is available or is associated with that response. Executive functions tend to be invoked when it is necessary to override prepotent responses that would otherwise occur automatically. For example, on being presented with a potentially rewarding stimulus like a piece of chocolate cake, a

person might have the prepotent "automatic" response to take a bite. But if this behavior conflicts with internal plans (such as a diet), the executive system might be engaged to inhibit that response.

Anatomy of the Executive System

Historically, the executive functions have been thought to be regulated by the prefrontal regions of the frontal lobes, but this is a matter of ongoing debate. Though prefrontal regions of the brain are necessary for executive function, it seems that non-frontal regions come into play as well. The most likely explanation is that while the frontal lobes participate in all executive functions, other brain regions are necessary. The major frontal structures involved in executive function are:

- Dorsolateral prefrontal cortex: associated with verbal and design fluency, set shifts, planning, response inhibition, working memory, organizational skills, reasoning, problem solving, and abstract thinking.
- Anterior cingulate cortex: inhibition of inappropriate responses, decision making, and motivated behaviors.
- Orbitofrontal cortex: impulse control, maintenance of set, monitoring ongoing behavior, socially appropriate behavior, representing the value of rewards of sensory stimuli.[42]

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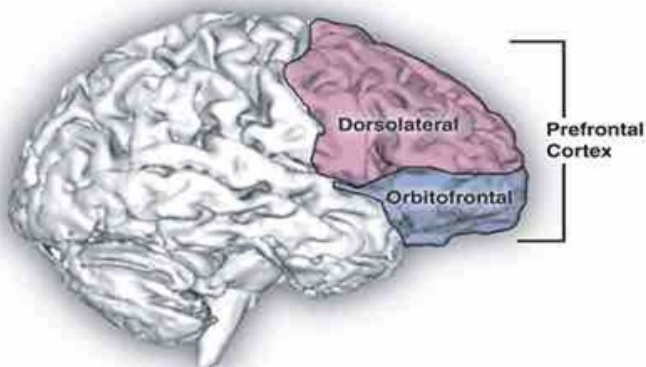
The prefrontal cortex: The different parts of the prefrontal cortex are vital to executive function.[50]

Development of the Executive System

The abilities of the executive system mature at different rates over time because the brain continues to mature and develop connections well into adulthood. Therefore, a developmental framework is helpful. Executive-function corresponds to the development of the growing brain; as the processing capacity of the frontal lobes (and other interconnected regions) increases, the core executive functions emerge. Growth spurts also occur in the development of the executive functions; their maturation is not a linear process.

In early childhood, the primary executive functions to emerge are working memory and inhibitory control. Cognitive flexibility, goal-

directed behavior, and planning also begin to develop, but are not fully functional.[43]

A child shows higher executive functioning skills when the parents are more warm and responsive, use scaffolding when the child is trying to solve a problem, and provide cognitively stimulating environments for the child (Fay-Stammbach, Hawes & Meredith, 2014). For instance, scaffolding was positively correlated with greater cognitive flexibility at age two and inhibitory control at age four (Bibok, Carpendale & Müller, 2009). In Schneider, Kron-Sperl and Hunnerkopf's (2009) longitudinal study of 102 kindergarten children, the majority of children used no strategy to remember information, a finding that was consistent with previous research. As a result, their memory performance was poor when compared to their abilities as they aged and started to use more effective memory strategies.[44]

During **preadolescence**, there are major increases in verbal working memory, goal-directed behavior, selective attention, cognitive flexibility, and strategic planning. In adolescence, these functions all become better integrated as they continue developing.[45]

However, **self-regulation**, or the ability to control impulses, may still fail. A failure in self-regulation is especially true when there is high stress or high demand on mental functions (Luciano & Collins, 2012). While high stress or demand may tax even an adult's self-regulatory abilities, neurological changes in the adolescent brain

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may make teens particularly prone to more risky decision making under these conditions.[46]

Metacognition

Metacognition refers to the knowledge we have about our own thinking and our ability to use this awareness to regulate our own cognitive processes (Bruning, Schraw, Norby, & Ronning, 2004). Children in this developmental stage also have a better understanding of how well they are performing a task, and the level of difficulty of a task. As they become more realistic about their abilities, they can adapt studying strategies to meet those needs. Young children spend as much time on an unimportant aspect of a problem as they do on the main point, while older children start to learn to prioritize and gauge what is significant and what is not. As a result, they develop metacognition.

   Critical thinking, or a detailed examination of beliefs, courses of action, and evidence, involves teaching children how to think. The purpose of critical thinking is to evaluate information in ways that help us make informed decisions. Critical thinking involves better understanding a problem through gathering, evaluating, and selecting information, and also by considering many possible solutions. Ennis (1987) identified several skills useful in critical thinking. These include: Analyzing arguments, clarifying information, judging the credibility of a source, making value judgments, and deciding on an action. Metacognition is essential to critical thinking because it allows us to reflect on the information as we make decisions.

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Children differ in their cognitive process and these differences predict both their readiness for school, academic performance, and testing in school. (Prebler, Krajewski, & Hasselhorn, 2013).[47] Much of the current study regarding metacognition within the field of cognitive psychology deals with its application within the area of education. Educators strive to increase students' metacognitive abilities in order to enhance their learning, study habits, goal setting, and self-regulation.[56]

Theory of Mind

Theory of mind refers to the ability to think about other people's thoughts. This mental mind reading helps humans to understand and predict the reactions of others, thus playing a crucial role in social development. One common method for determining if a child has reached this mental milestone is the false belief task, described below.

The research began with a clever experiment by Wimmer and Perner (1983), who tested whether children can pass a false-belief test. The child is shown a picture story of Sally, who puts her ball in a basket and leaves the room. While Sally is out of the room, Anne comes along and takes the ball from the basket and puts it inside a box. The child is then asked where Sally thinks the ball is located when she comes back to the room. Is she going to look first in the

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box or in the basket? The right answer is that she will look in the basket, because that's where she put it and thinks it is; but we have to infer this false belief against our own better knowledge that the ball is in the box.

This is very difficult for children before the age of four because of the cognitive effort it takes. Three-year-olds have difficulty distinguishing between what they once thought was true and what they now know to be true. They feel confidentthat what they know now is what they have always known (Birch & Bloom, 2003). Even adults need to think through this task (Epley, Morewedge, & Keysar, 2004).

To be successful at solving this type of task the child must separate what he or   she "knows" to be true from what someone else might "think" is true. In Piagetian terms, they must give up a tendency toward egocentrism. The child must also understand that what guides people's actions and responses are what they "believe" rather than what is reality. In other words, people can mistakenly believe things that are false and will act based on this false knowledge. Consequently, prior to age four children are rarely successful at solving such a task (Wellman, Cross & Watson, 2001).

Researchers examining the development of theory of mind have been concerned by the overemphasis on the mastery of false belief as the primary measure of whether a child has attained theory of mind. Wellman and his colleagues (Wellman, Fang, Liu, Zhu & Liu, 2006) suggest that theory of mind is comprised of a number of components, each with its own developmental timeline.

Two-year-olds understand the diversity of desires, yet as noted earlier it is not until age four or five that children grasp false belief, and often not until middle childhood do they understand that people may hide how they really feel. In part, because children in early childhood have difficulty hiding how they really feel.

This awareness of the existence of theory of mind is part of social intelligence, such as recognizing that others can think differently about situations. It helps us to be self-conscious or aware that others can think of us in different ways and it helps us to be able

to be understanding or be empathetic toward others. Moreover, this mind reading ability helps us to anticipate and predict people's actions. The awareness of the mental states of others is important for communication and social skills.[48]

Theory of Mind begins to increase in adolescence and is an important component of social problem solving and conflict avoidance. According to one longitudinal study, levels of cognitive empathy begin rising in girls around 13 years old, and around 15 years old in boys (Van der Graaff et al., 2013).[49]

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8. Intelligence and the School Experience

Intelligence

Classifying Intelligence: One vs. Many

The early 1900s saw Charles Spearman using a mathematical approach to the question of measuring human intelligence. Using statistical **factor analysis** Spearman identified *g*, a single underlying intelligence factor he believed accounted for the variety of observable abilities.

Charles Spearman 1863-1945[1]

Spearman noticed that children's grades across all school subjects tended to be highly correlated. If a child did well in one subject, they generally also did well in another subject, and vice versa. What did this say about the nature of intelligence? He devised factor analysis to measure the relationships between seemingly varied cognitive

1. Image from Wikimedia Commons licensed under Library of Congress. Image is public domain.

abilities and account for the correlations he saw between scores on different tests.

The result was Spearman's two-factor theory which attempted to show that all cognitive performance can be explained by two variables: one general ability (g) and the many specific abilities or (**s**) it gave rise to. Later, however, further analysis showed that g alone was enough to explain the correlations between different tests. When people talk about IQ or intelligence, it's usually this general mental ability that they are referring to. Today, almost all IQ tests are factor models inspired by Spearman's work on g. [2]

Charles Spearman's noted student Raymond Cattell expanded on Spearman's theory of a unified *g* and explored the difference between two independent but correlated factors of general intelligence: **crystallized intelligence** and **fluid intelligence**, which he called Gc and Gf. [3]

Raymond Cattell 1905-1998[4]
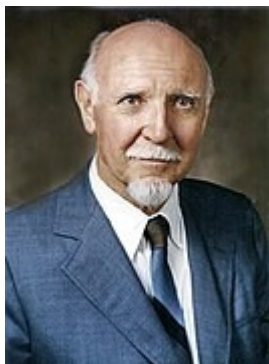
Crystallized intelligence is characterized as acquired knowledge and the ability to retrieve it. When you learn, remember, and recall information, you are using crystallized intelligence. You use crystallized intelligence all the time in your coursework by demonstrating that you have mastered the information covered in the course. Fluid intelligence encompasses the ability to see complex relationships and solve problems. Navigating your way home after being detoured onto an unfamiliar route because of road construction would draw upon your intelligence. Fluid intelligence helps you tackle complex, abstract challenges in your daily life, whereas crystallized intelligence helps you overcome concrete, straightforward problems (Cattell, 1963).[5]

Research demonstrates that older adults have more crystallized intelligence, as reflected in **semantic knowledge**, vocabulary, and language. As a result, older adults generally outperform younger people on measures of history, geography, and even on crossword puzzles, where this information is useful (Salthouse, 2004). This superior knowledge, combined with a slower and more complete processing style and sophisticated understanding of the workings of the world, gives those older an advantage, despite greater fluid intelligence in those younger (Baltes, Staudinger, & Lindenberger, 1999; Scheibe, Kunzmann, & Baltes, 2009). The differential changes in crystallized versus fluid intelligence also explains why those older do not necessarily show poorer performance on tasks that require experience, although they show poorer memory overall. A young chess player may think more quickly, but a more experienced chess player has more knowledge to draw on.[6]

Triarchic Theory: One advocate of the idea of multiple

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intelligences is the psychologist Robert Sternberg. Sternberg has proposed a triarchic (three-part) theory of intelligence that proposes that people may display more or less **analytical intelligence**, **creative intelligence**, and **practical intelligence**.[7]

Sternberg (1985, 2003) defined the three intelligences as:

- **Analytical intelligence** or the ability to perform academic problem solving
- **Creative intelligence** or the ability to adapt to new situations and create new ideas
- **Practical intelligence** or the ability to demonstrate street smarts and common sense [8]

Sternberg (1985, 2003) argued that traditional intelligence tests assess analytical intelligence, but that they do not typically assess creative intelligence, and/or practical intelligence.[9]

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Reading supports analytical Intelligence [10]

Building shows creative intelligence [11]

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Building shows creative intelligence [11]

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Navigating social settings is practical intelligence.[12]

As Sternberg proposed, research has found that creativity is not highly correlated with analytical intelligence (Furnham & Bachtiar, 2008) and exceptionally creative scientists, artists, mathematicians, and engineers do not score higher on intelligence than do their less, creative peers (Simonton, 2000).

Furthermore, the brain areas that are associated with **convergent thinking**, thinking that is directed toward finding the correct answer to a given problem, are different from those associated with **divergent thinking**, the ability to generate many different ideas or solutions to a single problem (Tarasova, Volf, & Razoumnikova,

2010). On the other hand, being creative often takes some of the basic abilities measured by "g", including the abilities to learn from experience, to remember information, and to think abstractly (Bink & Marsh, 2000).

The last aspect of the triarchic model, practical intelligence, refers to intelligence that cannot be gained from books or formal learning. Practical intelligence represents a type of "street smarts" or "common sense" that is learned from life experiences. Although a number of tests have been devised to measure practical intelligence (Sternberg, Wagner, & Okagaki, 1993; Wagner & Sternberg, 1985), research has not found much evidence that practical intelligence is distinct from "g" or that it is predictive of success at any particular tasks (Gottfredson, 2003). Practical intelligence may include, at least in part, certain abilities that help people perform well at specific jobs, and these abilities may not always be highly correlated with general intelligence (Sternberg et al.1993).

Multiple Intelligence Theory – Howard Gardner: Another champion of the idea of specific types of intelligences rather than one overall intelligence is the psychologist Howard Gardner (1983, 1999). Gardner argued that it would be evolutionarily functional for different people to have different talents and skills and proposed that there are eight intelligences that can be differentiated from each other. A potential ninth intelligence; that is, existential still needs empirical support. Gardner investigated intelligences by focusing on children who were talented in one or more areas and adults who suffered from strokes that compromised some capacities, but not others. Gardner also noted that some evidence for multiple intelligences comes from the abilities of **autistic savants**, people who score low on intelligence tests overall, but who nevertheless may have exceptional skills in a given domain, such as math, music, art, or in being able to recite statistics in a given sport (Treffert & Wallace, 2004). In addition to brain damage and the existence of savants, Gardner identified these 8 intelligences

based on other criteria including a set developmental history and psychometric findings. [13]

Howard Gardner (1943)[14]

The first three are skills that are measured by IQ tests:

- Logical-mathematical: the ability to solve mathematical problems; problems of logic, numerical patterns
- Linguistic: vocabulary, reading comprehension, function of language
- Spatial: visual accuracy, ability to read maps, understand space and distance

The next six represent skills that are not measured in standard IQ tests but are talents or abilities that can also be important for success in a variety of fields. These are:

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- Musical: ability to understand patterns in music, hear pitches, recognize rhythms and melodies
- Bodily-kinesthetic: motor coordination, grace of movement, agility, strength
- Naturalistic: knowledge of plants, animals, minerals, climate, weather
- Interpersonal: understand the emotion, mood, motivation of others; able to communicate effectively
- Intrapersonal: understanding of the self, mood, motivation, temperament, realistic knowledge of strengths, weaknesses

The potential ninth intelligence is:

- Existential: concern about and understanding of life's larger questions, meaning of life, or spiritual matters

A high IQ does not always ensure success in life or necessarily indicate that a person has common sense, good interpersonal skills or other abilities important for success [15]

The idea of multiple intelligences has been influential in the field of education, and teachers have used these ideas to try to teach differently to different students. For instance, to teach math problems to students who have particularly good kinesthetic intelligence, a teacher might encourage the students to move their bodies or hands according to the numbers. On the other hand, some have argued that these "intelligences" sometimes seem more like "abilities" or "talents" rather than real intelligence. There is no clear conclusion about how many intelligences there are. Are a sense of humor, artistic skills, dramatic skills, and so forth also separate intelligences? Furthermore, and again demonstrating the

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15. [12] Lifespan Development - Module 5: Early Childhood by Lumen Learning references Psyc 200 Lifespan Psychology by Laura Overstreet, licensed under CC BY 4.0 (modified by Marie Parnes)

underlying power of a single intelligence, the many different intelligences are, in fact, correlated and thus represent, in part, "g" (Brody, 2003).

Measuring Intelligence: Standardization and the Intelligence Quotient

The goal of most intelligence tests is to measure "g", the general intelligence factor. Good intelligence tests are **reliable**, meaning that they are consistent over time, and also demonstrate **validity**, meaning that they actually measure intelligence rather than something else. Because intelligence is such an important individual difference dimension, psychologists have invested substantial effort in creating and improving measures of intelligence, and these tests are now considered the most accurate of all psychological tests. In fact, the ability to accurately assess intelligence is one of the most important contributions of psychology to everyday public life.

Intelligence changes with age. A 3-year-old who could accurately multiply 183 by 39 would certainly be intelligent, but a 25-year-old who could not do so would be seen as unintelligent. Thus, understanding intelligence requires that we know the norms or standards in a given population of people at a given age. The **standardization** of a test involves giving it to a large number of people at different ages and computing the average score on the test at each age level.

It is important that intelligence tests be standardized on a regular basis, because the overall level of intelligence in a population may change over time. The **Flynn Effect** refers to the observation that scores on intelligence tests worldwide have increased substantially over the past decades (Flynn, 1999). Although the increase varies somewhat from country to country, the average increase is about 3 IQ points every 10 years. There are many explanations for the Flynn effect, including better nutrition, increased access to information,

and more familiarity with multiple-choice tests (Neisser, 1998). Whether people are actually getting smarter, however, is debatable (Neisser, 1997). Most of the increase in IQ occurred during the second half of the 20th century. Recent research has found a reversal of the Flynn effect in several nations around the world, although some nations still show an increase in IQ scores (Dutton, van der Linden, & Lynn, 2016).

Once the standardization has been accomplished, we have a picture of the average abilities of people at different ages and can calculate a person's **mental age**, which is the age at which a person is performing intellectually. If we compare the mental age of a person to the person's **chronological age**, the result is the **Intelligence Quotient** (IQ), a measure of intelligence that is adjusted for age. A simple way to calculate IQ is by using the following formula:

IQ = mental age ÷ chronological age × 100.

Thus a 10-year-old child who does as well as the average 10-year-old child has an IQ of 100 (10 ÷ 10 × 100), whereas an 8-year-old child who does as well as the average 10-year-old child would have an IQ of 125 (10 ÷ 8 × 100).

However, most modern intelligence tests are based on the relative position of a person's score among people of the same age, rather than on the basis of this formula, but the idea of an intelligence "ratio" or quotient" provides a good description of the score's meaning.[16]

16. Child Growth and Development: An Open Educational Resources Publication by College of the Canyons by Jennifer Paris, Antoinette Ricardo, and Dawn Richmond is licensed under CC BY 4.0

Intelligence Tests

Alfred Binet & Théodore Simon – Stanford- Binet Intelligence Test

In the early 1900s, the Ministry of Education in France tasked psychologists Alfred Binet and Theodore Simon with devising a way to identify children who were struggling with ordinary class and needed extra attention. The result of their work helped inspire an intelligence test still in use today.

France was making advancements in its education system and intended to reduce the number of struggling children being diverted into asylums. Binet and Simon were appointed to the now unfortunately named Commission for the Retarded, where they became curious about how to study children's intelligence experimentally. They developed the **Binet-Simon scale** and made many subsequent adjustments.

Alfred Binet (1857-1911)[17]

Based on their experience and observations, the pair included

thirty questions they believed a child at each age ought to be able to answer. They gave their test to a group of children selected by teachers as being average, to confirm the test as a standard by which other children could be compared. Questions ranged from very easy (name various body parts) to more difficult (find rhyming words or remember a string of numbers). If, for example, a 9-year-old child passed all the questions that most other 9-year-old children passed, they were scored as having a mental age of 9.

Standford-Binet

Lewis Terman (1877-1956)[18]

Lewis Terman standardized the Binet-Simon test for the more diverse American population in 1916, where it flourished as a new tool in a rapidly changing political environment, becoming the **Stanford-Binet Intelligence Test**. The Stanford-Binet remained

18. Image from Wikimedia Commons is public domain.

America's most popular test for general intelligence for decades, and in World War I Robert Yerkes worked with both Terman and Goddard to design a controversial test that screened men for training to become officers.[19]

Sample practice question on the Stanford-Binet V. The child is asked to identify the picture. A bike or bicycle would be the correct answer. [20]

Wechsler Scales of Intelligence

David Wechsler (1896-1981)[21]

A number of scales are based on IQ. The **Wechsler Adult Intelligence Scale** (WAIS) is the most widely used intelligence test for adults (Watkins, Campbell, Nieberding, & Hallmark, 1995). The current version of the WAIS, the WAIS-IV, was standardized on 2,200 people ranging from 16 to 90 years of age. It consists of 15 different tasks, each designed to assess intelligence, including working memory, arithmetic ability, spatial ability, and general knowledge about the world. The WAIS-IV yield scores on four domains: verbal, perceptual, working memory, and processing speed. The reliability of the test is high (more than 0.95), and it shows substantial construct validity. The WAIS-IV is correlated highly with other IQ tests such as the Stanford-Binet, as well as with criteria of academic and life success, including college grades, measures of work performance, and occupational level. It also shows significant correlations with measures of everyday functioning among people with intellectual disabilities.

The Wechsler scale has also been adapted for preschool children in the form of the **Wechsler Primary and Preschool Scale of**

Intelligence-Fourth Edition (WPPSI-IV) and for older children and adolescents in the form of the **Wechsler Intelligence Scale for Children-Fifth Edition** (WISC-V).[22]

The WPPSI-IV is an individually administered intelligence test designed for children aged 2 years and 6 months to 7 years and 7 months. It does not measure academic achievement or "school" skills. Rather, it attempts to predict what a child might be capable of, given an ideal set of circumstances. The actual realization of skills is dependent upon adequate educational opportunities, experience, and exposure. The WPPSI-IV is composed of a variety of individually administered subtests, each of which measures a specific area of cognitive ability. The subtests are grouped into categories, and the scores are presented as percentiles, not percentages. The subtests on the WPPSI-IV alternate between verbal and nonverbal tasks.[23]

The WISC-V is composed of 10 subtests, which comprise four indices, which then render an IQ score. The four indices are Verbal Comprehension, Perceptual Reasoning, Working Memory, and Processing Speed. When the test is complete, individuals receive a score for each of the four indices and a Full-Scale IQ score (Heaton, 2004). The method of scoring reflects the understanding that intelligence is comprised of multiple abilities in several cognitive realms and focuses on the mental processes that the child used to arrive at his or her answers to each test item Heaton, 2004).[24]

Potential Bias of Intelligence Testing

22. Lifespan Development: A Psychological Perspective 2nd Edition by Martha Lally and Suzanne Valentine-French is licensed under CC BY-NC-SA 3.0 (modified by Marie Parnes)

23. Private School Testing: What ls the WPPSI-IV? How do Schools Use it? by Valerie Slattery, Ph.D retrieved from Lowell   School blog – public domain

24. Introduction to Psychology – Thinking and Intelligence by Lumen Learning   is licensed under CC BY 4.0 (modified by Marie Parnes)

Intelligence tests and psychological definitions of intelligence have been heavily criticized since the 1970s for being biased in favor of Anglo-American, middle-class respondents and for being inadequate tools for measuring non-academic types of intelligence or talent. Intelligence changes with experience, and intelligence quotients or scores do not reflect that ability to change. What is considered smart varies culturally as well, and most intelligence tests do not take this variation into account. For example, in the West, being smart is associated with being quick. A person who answers a question the fastest is seen as the smartest, but in some cultures being smart is associated with considering an idea thoroughly before giving an answer. A well-thought-out, contemplative answer is the best answer.

Extremes of Intelligence: Intellectual Disability and Giftedness

The results of studies assessing the measurement of intelligence show that IQ is distributed in the population in the form of a **normal distribution** (or bell curve), which is the pattern of scores usually observed in a variable that clusters around its average. In a normal distribution, the bulk of the scores fall toward the middle, with fewer scores falling at the extremes. The normal distribution of intelligence shows that on IQ tests, as well as on most other measures, the majority of people cluster around the average (in this case, where IQ = 100), and fewer are either very smart or very dull (see Figure 5.13). Because the standard deviation of an IQ test is about 15, this means that about 2% of people score above an IQ of 130, often considered the threshold for giftedness, and about the same percentage score below an IQ of 70, often being considered the threshold for an intellectual disability.

Normal Distribution of Intelligence Scores
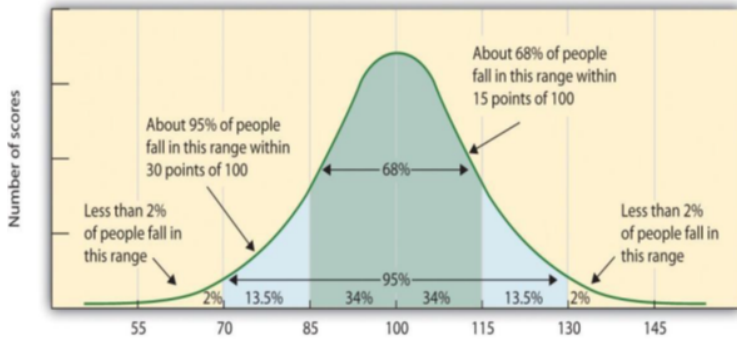
The normal distribution of IQ scores in the general population shows that most people have about average intelligence, while very few have extremely high or extremely low intelligence.[25]

The normal distribution of IQ scores in the general population shows that most people have about average intelligence, while very few have extremely high or extremely low intelligence. One end of the distribution of intelligence scores is defined by people with very low IQ. **Intellectual disability** (or **intellectual developmental disorder**) is assessed based on cognitive capacity (IQ) and adaptive functioning. The severity of the disability is based on adaptive

25. Lifespan Development: A Psychological Perspective 2nd Edition by Martha Lally and Suzanne Valentine-French is licensed under CC BY-NC-SA 3.0 .

functioning, or how well the person handles everyday life tasks. About 1% of the United States population, most of them males, fulfill the criteria for intellectual developmental disorder, but some children who are given this diagnosis lose the classification as they get older and better learn to function in society. A particular vulnerability of people with low IQ is that they may be taken advantage of by others, and this is an important aspect of the definition of intellectual developmental disorder (Greenspan, Loughlin, & Black, 2001). [26]

There are four subtypes of Intellectual Disability: mild, moderate, severe, and profound. The Diagnostic and Statistical Manual of Psychological Disorders lists the following criteria for each subgroup (APA, 2013):

Four Subtypes of Intellectual Disability[27]

Intellectual Disability Subtype	Percentage of Intellectually Disabled Population	Description
Mild	85%	3rd- to 6th-grade skill level in reading, writing, and math; may be employed and live independently
Moderate	10%	Basic reading and writing skills; functional self-care skills; requires some oversight
Severe	5%	Functional self-care skills; requires oversight of daily environment and activities
Profound	<1%	May be able to communicate verbally or nonverbally; requires intensive oversight

One cause of intellectual developmental disorder is **Down syndrome**, a chromosomal disorder caused by the presence of all or part of an extra 21st chromosome. The incidence of Down syndrome is estimated at 1 per 800 to 1,000 births, although its prevalence

26. Lifespan Development: A Psychological Perspective 2nd Edition by Martha Lally and Suzanne Valentine-French is licensed under CC BY-NC-SA 3.0 . (Modified by Marie Parnes)
27. Measures of Intelligence by Openstax is licensed under CC-BY-4.0

rises sharply in those born to older mothers. People with Down syndrome typically exhibit a distinctive pattern of physical features, including a flat nose, upwardly slanted eyes, a protruding tongue, and a short neck.[28]


Physical features of Down Syndrome [29]

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29. Image Happy Walk 05 by Ray Leyesa is licensed under CC BY-NC-ND 2.0

Fetal Alcohol Spectrum Disorders are another cause of intellectual disability. This spectrum of disorders (FASD) is a group of conditions that can occur in a person whose mother ingested alcohol during pregnancy. **Fetal alcohol syndrome** (FAS) is the most severe disorder on this spectrum, and it is the leading cause of intellectual disability. This syndrome is caused when alcohol crosses the barrier of the **placenta** in a pregnant woman and damages the developing brain of the fetus. Alcohol exposure presents a risk of fetal brain damage at any point during a pregnancy since brain development is ongoing throughout pregnancy. FASD is estimated to affect between 2% and 5% of people in the United States and Western Europe. FAS is believed to occur in between 0.2 and 9 per 1000 live births in the United States.[30]

Craniofacial features associated with fetal alcohol syndrome

Facial features of FAS

Skin folds at the corner of the eye

Low nasal bridge

Short nose

Indistinct philtrum (groove between nose and upper lip)

Small head circumference

Small eye opening

Small midface

Thin upper lip
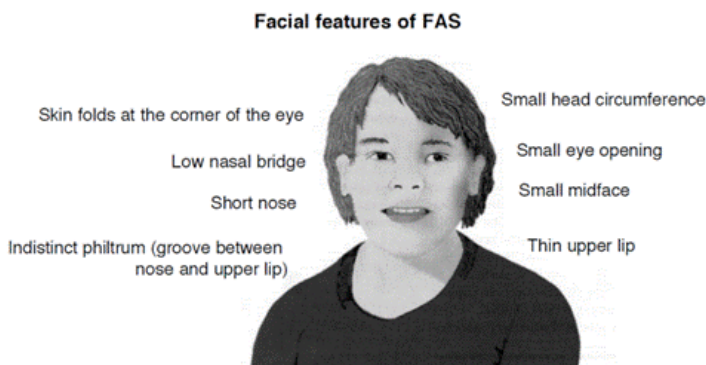
30. Intellectual Disabilities Boundless Psychology. Curation and Revision. Provided by: Boundless.com licensed by CC BY-SA 4.0

Diagram and Description of Adolescent with Fetal Alcohol Syndrome[31]

31. Image from Wikimedia. Licensed under public domain from the NIH/National Institute on Alcohol Abuse and Alcoholism.

Common Signs of Intellectual Disability

Usually, the more severe the degree of **intellectual disability**, the earlier the signs can be noticed. However, it might still be hard to tell how young children will be affected later in life. There are many signs of intellectual disability. For example, children with intellectual disability may:

- ◦ sit up, crawl, or walk later than other children
- ◦ learn to talk later, or have trouble speaking
- ◦ find it hard to remember things
- ◦ have trouble understanding social rules
- ◦ have trouble seeing the results of their actions
- ◦ have trouble solving problems [33]

Giftedness

Giftedness refers to children who have an IQ of 130 or higher (Lally & Valentine-French, 2015). Having an extremely high IQ is clearly less of a problem than having an extremely low IQ, but there may also be challenges to being particularly smart. It is often assumed that schoolchildren who are labeled as "gifted" may have adjustment problems that make it more difficult for them to create social relationships. To study gifted children, Lewis Terman and

32. Image from Wikimedia Commons and is licensed under CC BY SA 3.0
33. Facts About Intellectual Disabilities from the CDC is public domain.

his colleagues (Terman & Oden, 1959) selected about 1,500 high school students who scored in the top 1% on the Stanford-Binet and similar IQ tests (i.e., who had IQs of about 135 or higher), and tracked them for more than seven decades (the children became known as the "termites" and are still being studied today). This study found that these students were not unhealthy or poorly adjusted, but rather were above average in physical health and were taller and heavier than individuals in the general population. The students also had above-average social relationships and were less likely to divorce than the average person (Seagoe, 1975).

Terman's study also found that many of these students went on to achieve high levels of education and entered prestigious professions, including medicine, law, and science. Of the sample, 7% earned doctoral degrees, 4% earned medical degrees, and 6% earned law degrees. These numbers are all considerably higher than what would have been expected from a more general population. Another study of young adolescents who had even higher IQs found that these students ended up attending graduate school at a rate more than 50 times higher than that in the general population (Lubinski & Benbow, 2006).

As you might expect based on our discussion of intelligence, kids who are gifted have higher scores on general intelligence "g", but there are also different types of giftedness. Some children are particularly good at math or science, some at automobile repair or carpentry, some at music or art, some at sports or leadership, and so on. There is a lively debate among scholars about whether it is appropriate or beneficial to label some children as "gifted and talented" in school and to provide them with accelerated special classes and other programs that are not available to everyone. Although doing so may help the gifted kids (Colangelo & Assouline, 2009), it also may isolate them from their peers and make such provisions unavailable to those who are not classified as "gifted."[34]

34. Lifespan Development: A Psychological Perspective 2nd Edition by

Benefits of Gifted Programs

Gifted children often learn faster than their peers, and work more independently. Since their academic achievement is advanced, these students may become bored in a traditional classroom setting. This can sometimes lead to behavioral problems or lack of motivation. Schools face the challenge of how to work with gifted students academically to keep them challenged and engaged.

One way schools may handle this issue is to allow a gifted child to skip grades. The advantage to this solution is that the child will be doing coursework that is appropriate to their cognitive level. The potential disadvantages, however, are substantial: younger students will experience physical development later than their grade-level peers and may experience emotional development later as well. This may lead them to feel self-conscious about being different or to be bullied by their peers.

Another solution is to keep the child in the regular classroom but provide additional assignments and an enriched curriculum. In addition to the enriched curriculum, another option might be pull-out programs where the child leaves the classroom during certain times or days for advanced classes. Finally, some school districts create entire gifted classrooms.

Gifted programs can be beneficial to the gifted child by keeping the child engaged in learning. Some programs even offer gifted children college-level credit for advanced placement classes (with a passing grade on an assessment test). These programs can provide the child with opportunities to discover his or her potential.

Disadvantages of Gifted Programs

Gifted programs can also be detrimental to children. By labeling some children as "gifted" and others as "not gifted," schools can create a self-fulfilling prophecy where those who are not accepted into the program do not perform as well as those who are accepted.

The students identified as "not gifted" may believe they are not as intelligent as those who are labeled gifted, and in turn, they may not put forth the same effort at school. The **Pygmalion Effect** is a studied phenomenon in which higher expectations lead to better performance; the golem effect is the opposite phenomenon, in which lower expectations lead to lower performance. Teachers who are told their students are gifted will treat them as though they are gifted, which can result in increased performance; teachers who are told their students are "average" may be less patient when those students struggle than would be if they thought those students were gifted.

Another detriment to gifted programs is that students who are not identified as gifted are denied the benefits of enriched education. Gifted programs vary widely in what they offer, but some involve activities like field trips, talks from scholars, or cultural experiences, like visits to museums. These enrichment activities would benefit all children, not just the gifted.[35]

Children with Learning Disabilities

A **learning disability** (or LD) is a specific impairment of academic learning that interferes with a specific aspect of schoolwork and that reduces a student's academic performance significantly. An LD shows itself as a major discrepancy between a student's ability and some features of achievement: The student may be delayed in reading, writing, listening, speaking, or doing mathematics, but not in all of these at once. A learning problem is not considered a learning disability if it stems from physical, sensory, or motor handicaps, or from generalized intellectual impairment. It is also not an LD if the learning problem really reflects the challenges of learning English as a second language. Genuine LDs are the learning problems left over after these other possibilities are accounted for or excluded. Typically, a student with an LD has not been helped by

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35. The Intellectually Gifted Boundless Psychology. Curation and Revision. Provided by: Boundless.com licensed by CC BY-SA 4.0

teachers' ordinary efforts to assist the student when he or she falls behind academically, though what counts as an "ordinary effort", of course, differs among teachers, schools, and students. Most importantly, though, an LD relates to a fairly specific area of academic learning. A student may be able to read and compute well enough, for example, but not be able to write. LDs are by far the most common form of special educational need, accounting for half of all students with special needs in the United States and approximately 20% of all students, depending on how the numbers are estimated (National Center for Learning Disabilities, 2017). Students with LDs are so common, in fact, that most teachers regularly encounter at least one per class in any given school year, regardless of the grade level they teach. These difficulties are identified in school because this is when children's academic abilities are being tested, compared, and measured. Consequently, once academic testing is no longer essential in that person's life (as when they are working rather than going to school) these disabilities may no longer be noticed or relevant, depending on the person's job and the extent of the disability.

Types of Learning Disabilities

Dyslexia is one of the most commonly diagnosed disabilities and involves having difficulty in the area of reading. This diagnosis is used for a number of reading difficulties. Common characteristics are difficulty with phonological processing, which includes the manipulation of sounds, spelling, and rapid visual/verbal processing. Additionally, the child may reverse letters, have difficulty reading from left to right, or may have problems associating letters with sounds. It appears to be rooted in neurological problems involving the parts of the brain active in recognizing letters, verbally responding, or manipulating sounds. Recent studies have identified a number of genes that are linked to developing dyslexia (National Institute of Neurological Disorders and Stroke, 2016). Treatment typically involves altering teaching methods to accommodate the person's particular problematic area.

These written words show variations of the word "teapot" as written by individuals with dyslexia.[36]

Dysgraphia refers to a writing disability that is often associated with dyslexia (Carlson, 2013). There are different types of dysgraphia, including phonological dysgraphia when the person cannot sound out words and write them phonetically. Orthographic dysgraphia is demonstrated by those individuals who can spell regularly spelled words, but not irregularly spelled ones. Some individuals with dysgraphia experience difficulties in motor control and experience trouble forming letters when using a pen or pencil.

Dyscalculia refers to problems in math. Cowan and Powell (2014) identified several terms used when describing difficulties in

mathematics including dyscalculia, **mathematical learning disability**, and **mathematics disorder**. All three terms refer to students with average intelligence who exhibit poor academic performance in mathematics. When evaluating a group of third graders, Cowan and Powell (2014) found that children with dyscalculia demonstrated problems with working memory, reasoning, processing speed, and oral language, all of which are referred to as domain-general factors. Additionally, problems with multi-digit skills, including **number system knowledge**, were also exhibited.[37]

Children who have motor skills substantially below what is expected for their age are diagnosed with **dyspraxia** – or **developmental coordination disorder** DCD) as it is more formally known. They are not lazy, clumsy, or unintelligent – in fact, their intellectual ability is in line with the general population – but they do struggle with everyday tasks that require coordination.

A processing deficit in the auditory modality that spans multiple processes is **auditory processing disorder** (APD). To date, APD diagnosis is mostly based on the utilization of speech material. Unfortunately, acceptable non-speech tests that allow differentiation an actual central hearing disorder and related disorders such as specific language impairments are still not adequately available.

Difficulty processing or interpreting visual information is referred to as **visual processing disorder** (VPD). Kids with visual processing issues may have difficulty telling the difference between two shapes or finding a specific piece of information on a page.[38]

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38. Child Growth and Development: An Open Educational Resources Publication by College of the Canyons by Jennifer Paris, Antoinette

Children with Disabilities: Legislation

Since the 1970s political and social attitudes have moved increasingly toward including people with disabilities into a wide variety of "regular" activities. In the United States, the shift is illustrated clearly in the Federal legislation that was enacted during this time. Three major laws were passed that guaranteed the rights of persons with disabilities, and of children and students with disabilities in particular. The third law has had the biggest impact on education.

Rehabilitation Act of 1973, Section 504: This law, the first of its kind, required that individuals with disabilities be accommodated in any program or activity that receives Federal funding (PL 93-112, 1973). Although this law was not intended specifically for education, in practice it has protected students' rights in some extra-curricular activities for older students) and in some child care or after-school care programs (for younger students). If those programs receive Federal funding of any kind, the programs are not allowed to exclude children or youths with disabilities, and they have to find reasonable ways to accommodate the individuals' disabilities.

Americans with Disabilities Act of 1990 (or ADA)**:** This legislation also prohibited discrimination on the basis of disability, just as Section 504 of the Rehabilitation Act had done (PL 101-336, 1990). Although the ADA also applies to all people (not just to students), its provisions are more specific and "stronger" than those of Section 504. In particular, ADA extends to all employment and jobs, not just those receiving Federal funding. It also specifically requires accommodations to be made in public facilities such as with buses, restrooms, and telephones. ADA legislation is therefore responsible for some of the "minor" renovations in schools that you may have noticed in recent years, like wheelchair-accessible doors, ramps, and restrooms, and public telephones with volume controls.

Individuals with Disabilities Education Act (or IDEA): As its name implied, this legislation was more focused on education than either Section 504 or ADA. It was first passed in 1975, reauthorized in 2004 (PL 108-446, 2004), and most recently amended in 2015 through **Public Law 114-95**, as the **Every Student Succeeds Act** (United States Department of Education, 2017). In its current form, the law guarantees the following rights related to education for anyone with a disability from birth to age 21. The first two influence schooling in general, but the last three affect the work of classroom teachers rather directly: •

- **Free, appropriate education**: An individual or an individual's family should not have to pay for education simply because the individual has a disability, and   the educational program should be truly educational; i.e., not merely care-taking or babysitting the person.
- **Due process:** In case of disagreements between an individual with a disability and the schools or other professionals, there must be procedures for resolving the disagreements that are fair and accessible to all parties, including the person himself or herself or the person's representative.
- **Fair evaluation of performance in spite of disability:** Tests or other evaluations should not assume test taking skills that a person with a disability cannot reasonably be expected to have, such as holding a pencil, hearing or seeing questions, working quickly, or understanding and speaking orally. Evaluation procedures should be modified to allow for these differences. This provision of the law applies both to evaluations made by teachers and to school-wide or "high-stakes" testing programs.
- **Education in the "least restrictive environment":** Education for someone with a disability should provide as many educational opportunities and options for the person as possible, both in the short term and in the long term. In practice this requirement has meant including students in

regular classrooms and school activities as much as possible, though often not totally.

- **An individualized educational program (IEP)**: Given that every disability is unique, instructional planning for a person with a disability should be unique or individualized as well. In practice this provision has led to classroom teachers planning individualized programs jointly with other professionals (like reading specialists, psychologists, or medical personnel) as part of a team.

Evaluation and diagnosis can be the first step in helping provide children with disabilities the type of instruction and resources that will benefit them educationally, but diagnosis and labeling also have social implications. It is important to consider that children can be misdiagnosed and that once a child has received a diagnostic label, the child, teachers, and family members may tend to interpret actions of the child through that label. The label can also influence the child's self-concept. Consider, for example, a child who is misdiagnosed as learning disabled. That child may expect to have difficulties in school, lack confidence, and because of these expectations experience trouble. This **self-fulfilling prophecy** or tendency to act in such a way as to make what you predict will happen, will come true. This calls our attention to the power that labels can have whether or not they are accurately applied. It is also important to consider that children's difficulties can change over time; a child who has problems in school, may improve later or may live under circumstances as an adult where the problem (such as a delay in math skills or reading skills) is no longer relevant. That person, however, will still have a label as learning disabled. It should be recognized that the distinction between abnormal and normal

behavior is not always clear; some abnormal behavior in children is fairly common.[39]

Creativity and Intelligence

Models of Creativity

A general definition of **creativity** describes it as the ability to generate ideas, insights, and solutions that are original, flexible (Amabile, 1996; Sternberg and Lubart, 1996) and effective (Runco and Jaeger, 2012). A vast body of research has been conducted in this field from different points of view (psychological, pedagogical, educational, etc.). In brief, creativity can be understood as the combination of several factors (Treffinger et al., 1983; Houtz and Krug, 1995a, b) of both a cognitive (primarily related to divergent thinking) and an emotional type (primarily related to creative personality). On the cognitive side, there is a general convergence on the notion that creative outputs result from cognitive flexibility (flexible and divergent ways of thinking) and cognitive persistence (persistent and systematic way of thinking) (see Dietrich and Kanso, 2010). On the emotional side, Williams (1994) explored the emotional-divergent aspect of creativity, identifying the main characteristics of personality as (1) curiosity (the capacity to investigate elements and ideas, finding new and not always direct and obvious connections); (2) complexity (the tendency to look for new alternatives and solutions to problems, to restore order out of chaos); (3) imagination (the ability to visualize mental images); (4) risk-taking (the inclination to act unstructured conditions and to defend one's own ideas).

Creativity can be also seen as the result of interaction between the individual, the domain, and the field. For instance, Rhodes (1961, 1987) developed the 4 P's model which places creativity at the

39.   Lifespan Development: A Psychological Perspective 2nd Edition by Martha Lally and Suzanne Valentine-French is licensed under CC BY-NC-SA 3.0 .

interplay of four distinct strands, i.e., *process* (the different stages of a creative activity), the *person* (the characteristics of individuals), *press* (the qualities of the environment where creativity happens), and *product* (the tangible or intangible outcomes of the creative process). Rhodes' classification has become a major framework for the holistic exploration of creativity.[40]

However, creativity is not only the production of something new for the entire society (like arts): creativity is often found in an individual's everyday activities. In this sense, the literature defines two types of creativity: *Creativity* and *creativity*. "Capital C" creativity brings into existence something genuinely new that receives social validation (enhances culture) and is related to an accomplishment that consists of a clear-cut, eminent creative contribution. "Small C" creativity refers to ideas or products that are new to the person, but only to the person; it is, therefore, more focused on everyday activities, such as those creative actions in which everyone can be involved every day. Kaufman and Beghetto (2009) add another 2 Cs to their model, including a new category, a "little-c" for the little-c category, mini-c (Beghetto and Kaufman, 2007), which is connected with the learning process. Mini-C is defined as the novel and personally meaningful interpretation of experiences, actions, and events (Beghetto and Kaufman, 2007). Together with Mini-c, they introduce Pro-c, the developmental and effortful progression beyond little-c, not reaching Big-C status, on professional-level expertise in creative areas. The 5 A's framework (Glăveanu, 2013) goes beyond the 4 P's model to give a new

40. On the Edge Between Digital and Physical: Materials to Enhance Creativity in Children. An Application to Atypical Development by Michela Ponticorvo, Luigia Simona Sica, Angelo Rega, & Orazio Miglino retrieved from Frontiers in Psychology licensed under CC-BY license. (modified by Marie Parnes)

perspective on creativity: it introduces actor, action, artifact, audience, and affordances.[41]

The 4-p model
(Rhodes (1961, 1987))

Person

Process

Press

Product

Creativity is often in everyday individual's activities

"Capital C"
- Creativity brings into existence something genuinely new that receives social validation

"Small C"
- creativity refers to ideas or products that are new to the person, but only to the person
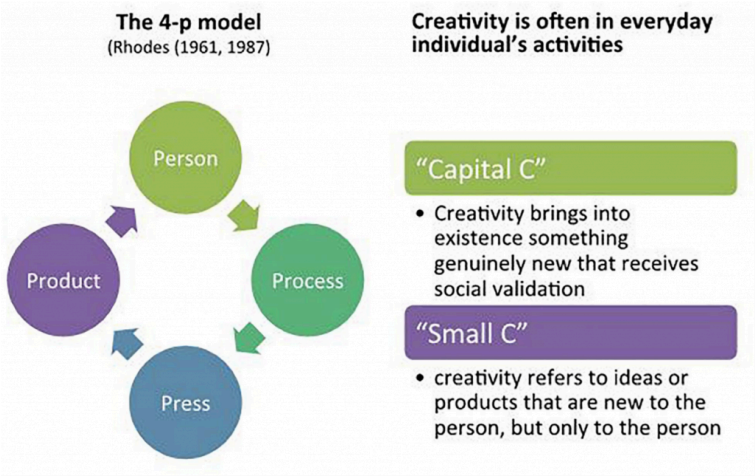
Two creativity models.[42]

41. On the Edge Between Digital and Physical: Materials to Enhance Creativity in Children. An Application to Atypical Development by Michela Ponticorvo, Luigia Simona Sica, Angelo Rega, & Orazio Miglino retrieved from Frontiers in Psychology licensed under CC-BY license. (modified by Marie Parnes)
42.   Image retrieved from On the Edge Between Digital and Physical: Materials to Enhance Creativity in Children. An Application to Atypical Development by Michela Ponticorvo, Luigia Simona Sica, Angelo Rega, & Orazio Miglino retrieved from Frontiers in Psychology licensed under CC-BY license.

Measures of Creativity

According to Guilford (1967), the core of creativity is **divergent thinking** (DT), which is the ability of an individual to generate as many answers as possible to a problem. As a result, DT tasks have long been employed to evaluate people's creativity (Sayed and Mohamed, 2013), and DT tests have become the most popular **psychometric assessment** tools in creativity research fields (Acar and Runco, 2014). Previous studies indicate that tests of DT are reliable and valid predictors of certain creative performance criteria, although they do not guarantee actual creative achievement (Runco and Acar, 2012). However, they are effective measurements to assess creative ability (Colzato et al., 2012). As one of the most well-constructed tests to assess creativity (Zhu et al., 2013), the **Torrance Test of Creative Thinking** (TTCT) is often employed in studies and it is widely given to elementary students to assess their creativity.[43]

Creativity From a Developmental Point of View

From what we said, it is clear that creativity can also be seen as a cognitive resource along the "life-span," starting from childhood. Indeed, children tend to exhibit a natural disposition toward creativity and expression; fluency (the ability to generate multiple ideas) and flexibility develop across distinct trajectories for divergent thinking and insight (Kleibeuker et al., 2013), explorative thinking characterizes middle adolescence (Johnson and Wilbrecht, 2011). Moreover, children can be sensitive to creativity outcomes from 3 years of age, which is quite early (Di Dio et al., 2007), and this sensitivity can enable them to develop their creative side. In

43. Divergent Thinking and Intelligence: An Empirical Study of the Threshold Hypothesis with Chinese Children by Baoguo Shi, Lijing Wang, Jiahui Yang, Mengpin Zhang and Li Xu retrieved from Frontiers in Psychology licensed under CC-BY license. (modified by Marie Parnes)

children with atypical developmental trajectories, creativity can offer support for adaptive processes (Hetzroni et al., 2019). If not stimulated, creativity can diminish. For instance, creativity diminishes by 40% between the ages of five and seven. This is due to the beginning of formal schooling with its educational rules which may inhibit commitment to creative thinking and behaviors (Amabile, 1996; McCormick and Plugge, 1997). New research has also led to a new understanding of the capacity for positive change and creative expression in the second half of life (Cohen, 2006). In general terms, psychological literature has highlighted that creativity can be interpreted as an individual resource, as a potent predictor of social problem-solving and adjustment (Ogoemeka, 2011). In other words, creative individuals are remarkable for their ability to adapt to almost any situation and exploit whatever possible to reach their goals (Csikszentmihalyi, 1996).

The paths to support individual development do not always consider creativity as a useful resource for well-being, despite research providing evidence to this effect. The role of creativity as a resource for individual well-being was identified: creativity and learning are strictly connected not only during childhood but also during young adulthood and adulthood (see Gajda et al., 2017). Long-term participation in creative activities has benefits for middle-aged and older people as they may improve their adaptation to later life (Adams-Price et al., 2018).[44]

Relationship between Intelligence and Creativity

There have been different conceptualizations regarding the relationship between intelligence and creativity However, of all explanations, the **threshold hypothesis** (Getzels and Jackson, 1962;

44. On the Edge Between Digital and Physical: Materials to Enhance Creativity in Children. An Application to Atypical Development by Michela Ponticorvo, Luigia Simona Sica, Angelo Rega, & Orazio Miglino retrieved from Frontiers in Psychology licensed under CC-BY license.

Guilford, 1967; Fuchs-Beauchamp et al., 1993) is a classical and notable hypothesis. According to this theory, the relationship between creativity and intelligence may vary at different levels of intelligence. Guilford and Christensen (1973) assumed a break in the correlation data between intelligence quotient (IQ) and creativity at an IQ level of approximately 120. Below an IQ level of 120, a correlation between IQ and creativity is observed, whereas no correlation is observed at IQ levels above 120. However, the results of other research yielded inconsistent results. Through the study of a gifted sample, Barron (1963, 1969) observed intelligence had no significant correlation with creativity but a significant correlation did exist in a sample of average intelligence. Schubert (1973) and Weinstein and Bobko (1980) discovered that the relationship between intelligence and creativity varies with different levels of IQ and intelligence has a weaker correlation with creativity in the top half of the intelligence range than in the bottom half of the intelligence range. In addition, with a sample of 338 gifted (IQ ≥ 130) and 220 non-gifted (IQ < 130) 7.8–14-year-old children, Guignard et al. (2016) indicated that the threshold effect was only found for correlations between verbal integrative thinking and perceptual reasoning or processing speed. In contrast to these points, some studies provide evidence that does not support the threshold hypothesis. For example, Runco and Albert (1986) used California Achievement Test (CAT) scores as the estimate of intelligence and discovered that the coefficient between divergent thinking (DT) and the CAT was very significant in the high ability group with fifth to eighth-grade students; this result refuted the threshold hypothesis. Preckel et al. (2006) examined the relationship between DT and fluid intelligence with a sample of 1328 German 12–16 years old students and discovered that correlations between both variables are almost equal at different IQ levels. Nevertheless, in a more recent study with a sample of Chinese elementary school children, Baoguo Shi et al., (2017) found support for the threshold hypothesis.

Another matter regarding the threshold hypothesis has to do with the **IQ break point**. As mentioned previously, research by Guilford

and Christensen (1973) assumed that the break IQ level is approximately 120. However, the results of research utilizing children of different age groups indicate that different thresholds exist within different age groups. For example, Karwowski and Gralewski (2013) observed a threshold of 115 IQ points in a sample of Polish middle school students after applying item response theory and confirmatory factor analysis. Jauk et al. (2013) examined the threshold of intelligence in a sample of adult participants by **segmented regression analysis** and obtained a threshold of 104.00 (or 119.60) IQ points for the originality of two (or many) original ideas and a threshold of 86.09 IQ points for ideational fluency. For a particularly advanced indicator such as creative achievement, no threshold effect was observed, which suggests that intelligence is linked with creative achievement across the entire IQ range. Mourgues et al. (2016) explored the threshold theory with 4368 third to eleventh-grade Saudi Arabian students. Only for sixth to eighth (108.8) graders and ninth to eleventh (108.4) graders the thresholds were detected. Baoguo Shi et al., (2017) found breakpoints around 110 IQ level in their sample of elementary school children.

Welter et al.(2016) contend that the association between intelligence and creativity is not straightforward and is dependent on a combination of factors, including grade level and gender. Overall, the evidence suggests that intelligence is necessary for creativity but not sufficient.[45]

Testing in Schools

Children's academic performance is often measured with the use

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of standardized tests. Those tests include but are not limited to Achievement and Aptitude tests.

Achievement tests are used to measure what a child has already learned. Achievement tests are often used as measures of teaching effectiveness within a school setting and as a method to make schools that receive tax dollars (such as public schools, charter schools, and private schools that receive vouchers) accountable to the government for their performance.

Aptitude tests are designed to measure a student's ability to learn or to determine if a person has potential in a particular program. These are often used at the beginning of a course of study or as part of college entrance requirements. The Scholastic Aptitude Test (SAT) and Preliminary Scholastic Aptitude Test (PSAT) are perhaps the most familiar aptitude tests to students in grades 6 and above. Learning test-taking skills and preparing for SATs has become part of the training that some students in these grades receive as part of their pre-college preparation. Other aptitude tests include the MCAT (Medical College Admission Test), the LSAT (Law School Admission Test), and the GRE (Graduate Record Examination). Intelligence tests are also a form of an aptitude test, which are designed to measure a person's ability to learn.[46]

What Happened to No Child Left Behind?

In 2001, President Bush signed into effect Public Law 107-110, better known as the **No Child Left Behind Act** mandating that schools administer achievement tests to students and publish those results so that parents have an idea of their children's performance. Additionally, the government would have information on the gaps in educational achievement between children from various social classes, racial, and ethnic groups.

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Schools that showed significant gaps in these levels of performance were mandated to work toward narrowing these gaps. Educators criticized the policy for focusing too much on testing as the only indication of student performance. Target goals were considered unrealistic and set by the federal government rather than individual states. Because these requirements became increasingly unworkable for schools, changes to the law were requested. On December 12, 2015, President Obama signed into law the **Every Student Succeeds Act** (ESSA). This law is state-driven and focuses on expanding educational opportunities and improving student outcomes, including in the areas of high school graduation, drop-out rates, and college attendance.[47]

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9. Language Development

Learning Objectives

After reading Chapter 9, you should be equipped to:

- Describe the complexity of language and identify the qualities that make it unique.
- Compare and contrast the different theories of language development.
- Identify and describe the different components of language.
- Explain the developmental course of language and the mechanisms that influence it.
- Identify the different speech and language disorders.
- Describe the outcomes for a bilingual child.

What is Language?

Our vast intelligence also allows us to have **language**, *a system of*

communication that uses symbols in a regular way to create meaning.
[1]

Human language is the most complex behavior on the planet and, at least as far as we know, in the universe. Language involves both the ability to comprehend spoken and written words and to create communication in real-time when we speak or write. Most languages are oral, generated through speaking. Speaking involves a variety of complex cognitive, social, and biological processes including the operation of the vocal cords, and the coordination of breath with movements of the throat, mouth, and tongue.

Other languages are **sign languages**, in which the communication is expressed by movements of the hands. The most common sign language is American Sign Language (ASL), commonly used in many countries across the world and adapted for use in varying countries. The other main sign language used in Canada is la Langue des Signes Quebecoise (LSQ); there is also a regional dialect, Maritimes Sign Language (MSL).

1. Lifespan Development: A Psychological Perspective 2nd Edition by Martha Lally and Suzanne Valentine-French is licensed under CC BY-NC-SA 3.0 (modified by Marie Parnes)[2] Introduction to Psychology - 1st Canadian Edition by Jennifer Walinga and Charles Stangor is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License, except where otherwise noted (modified by Marie Parnes)

Communication using sign language. [2]

Although language is often used for the transmission of information ("turn right at the next light and then go straight," "Place tab A into slot B"), this is only its most mundane function. Language also allows us to access existing knowledge, draw conclusions, set and accomplish goals, and understand and communicate complex social relationships. Language is fundamental to our ability to think, and without it, we would be nowhere near as intelligent as we are.

Language can be conceptualized in terms of sounds, meaning, and the environmental factors that help us understand it. A **phoneme** is the elementary sounds of our language. A **morpheme** *is* the smallest units of meaning in a language. **Syntax** is the set of grammatical

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rules that control how words are put together, and **context** is the element of communication that is not part of the content of language but helps us understand its meaning. [3]

Finally, human language is unique on the planet because it has the qualities of generativity, recursion, and displacement:

- **Generativity** – Human language is generative, which means that it can communicate an infinite number of ideas. This is because **Phonemes**it is combinatorial: words can be combined in different orders to create different larger meanings of a sentence. Animal communication does not have this freedom; animals communicate within closed systems, with limited possible ideas to communicate. Birds may have different chirps to signify danger or the location of food, but they cannot combine those to convey a novel meaning.
- **Recursion** – Human language is recursive. This means that we can put words, phrases, and sentences inside of themselves without limits. For example, we can say the sentence "Mark likes anchovies." But we can also put that sentence inside of a sentence: "Carol thinks that Mark likes anchovies." Then we can put *that* sentence inside of *another* sentence: "Greg said that Carol thinks that Mark likes anchovies," and on and on forever. Obviously, the recursive abilities of language are constrained by the limits of time and memory. But in theory, because units of human language have the ability to be self-containing, we could have an infinite sentence. Animal communication does not have this same flexibility.
- **Displacement (in language)** – Human language has

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displacement. This means that through the power of language, we can refer to things that aren't present spatially or temporally. This is obviously a useful trait (it allows us to ask questions like "Where did I leave my wallet?"), and it is one that is largely missing from the animal kingdom. Bees actually do have limited displacement in their communication: They perform a waggle dance to communicate to other bees the location of the most recent food source they have visited. However, there is no temporal nuance beyond this. Ants and ravens also have limited displacement systems.

Human language is also modality-independent—that is, it is possible to use the features of displacement, generativity, and recursion across multiple modes. Speaking is the auditory form of language, but writing and sign language are visual forms. There are also tactile forms, like **Braille**.[4]

Communicating in sign language [5]

Origins of Human Language

The earliest origins of human language are hotly contested, as it is hard to find direct evidence for when people first began to speak. It is also likely that there was an intermediate period during which our communication systems were comparable to those of other primates, and even if we did have knowledge of what this was like,

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it would be hard to say exactly when we crossed over from animal communication to human language.

Proto-Indo-European (PIE) is the name for the common ancestor of the Indo-European language family. A language family is a group of languages descended from a common language. The Indo-European language family contains 445 current languages, and all of them are thought to have descended from PIE.

Not all languages that have ever been spoken are still commonly used. For example, Latin, which was spoken in the Roman Empire, is now considered a dead language, or a language that has no native speakers.[6]

Theories of Language Development

Psychological theories of language learning differ in terms of the importance they place on nature and nurture. Remember that we are a product of both nature and nurture. Researchers now believe that language acquisition is partially inborn and partially learned through our interactions with our linguistic environment (Gleitman & Newport, 1995; Stork & Widdowson, 1974). First to be discussed are the biological theories, including nativism, brain areas, and critical periods. Next, learning theory and social pragmatics will be presented.

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Biological Theories of Language

Nativism

The linguist **Noam Chomsky** is a believer in the nature approach to language, or **nativism**, arguing that human brains contain a **language acquisition device (LAD)** that includes a **universal grammar** that underlies all human language (Chomsky, 1965, 1972). According to this approach, each of the many languages spoken around the world (there are between 6,000 and 8,000) is an individual example of the same underlying set of procedures that are hardwired into human brains. Chomsky's account proposes that children are born with a knowledge of general rules of syntax that determine how sentences are constructed. Language develops as long as the infant is exposed to it. No teaching, training, or reinforcement is required for language to develop as proposed by Skinner.

> Noam Chomsky contends that the human brain contains a Language Acquisition Device which contains universal grammar. [7]

Chomsky differentiates between the **deep structure** of an idea; that is, how the idea is represented in the fundamental universal grammar that is common to all languages, and the **surface structure** of the idea or how it is expressed in any one language. Once we hear or express a thought in surface structure, we generally forget exactly how it happened. For example, at the end of a lecture, you will remember a lot of the deep structure (i.e., the ideas expressed by the instructor), but you cannot reproduce the surface structure (the exact words that the instructor used to communicate the ideas).

Although there is general agreement among psychologists that babies are genetically programmed to learn language, there is still debate about Chomsky's idea that there is a universal grammar that can account for all language learning. Evans and Levinson (2009) surveyed the world's languages and found that none of the presumed underlying features of the language acquisition device were entirely universal. In their search, they found languages that did not have noun or verb phrases, that did not have tenses (e.g., past, present, future), and even some that did not have nouns or verbs at all, even though a basic assumption of a universal grammar is that all languages should share these features. [8]

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Brain Areas for Language

For the 90% of people who are right-handed, language is stored and controlled by the left cerebral cortex, although for some left-handers this pattern is reversed. These differences can easily be seen in the results of neuroimaging studies that show that listening to and producing language creates greater activity in the left hemisphere than in the right. **Broca's area**, an area in front of the left hemisphere near the motor cortex, is responsible for language production. This area was first localized in the 1860s by the French physician Paul Broca, who studied patients with lesions to various parts of the brain. [9] Damage to Broca's area can result in productive aphasia (also known as Broca's aphasia), or an inability to speak. Patients with Broca's can often still understand language, but they cannot speak fluently.[10]

Wernicke's area, an area of the brain next to the auditory cortex, is responsible for language comprehension.[11] Damage to this area results in receptive aphasia (also called Wernicke's aphasia). This type of aphasia manifests itself as a loss of comprehension, so sometimes while the patient can apparently still speak, their language is nonsensical and incomprehensible. [12]

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The **primary auditory cortex**, located in the temporal lobe and connected to the system, is organized so that it responds to neighboring frequencies in the other cells of the cortex. It is responsible for identifying pitch and loudness of sounds. The **angular gyrus**, located in the parietal lobe of the brain, is responsible for several language processes, including number processing, spatial recognition and attention.[13]
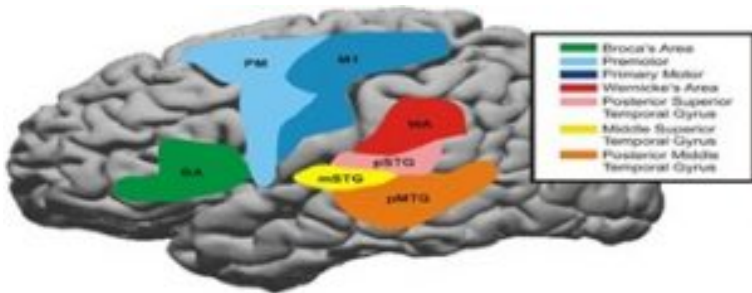
Language areas of the brain [14]

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Critical Periods

Psychologists believe there is a **critical period**, a time in which learning can easily occur, for language. This critical period appears to be between infancy and puberty (Lenneberg, 1967; Penfield & Roberts, 1959), but isolating the exact timeline has been elusive. Children who are not exposed to language early in their lives will likely never grasp the grammatical and communication nuances of language.

Case studies, including **Victor the "Wild Child**," who was abandoned as a baby in 18th century France and not discovered until he was 12, and **Genie**, a child whose parents kept her locked away from 18 months until 13 years of age, are two examples of children who were deprived of language. Both children made some progress in socialization after they were rescued, but neither of them ever developed a working understanding of language (Rymer, 1993). Yet, such case studies are fraught with many confounds. How much did the years of social isolation and malnutrition contribute to their problems in language development? A better test for the notion of critical periods for language is found in studies of children with hearing loss. Several studies show that the earlier children are diagnosed with hearing impairment and receive treatment, the better the child's long-term language development. For instance, Stika et al. (2015) reported that when children's hearing loss was identified during newborn screening, and subsequently addressed, the majority showed normal language development when later tested at 12-18 months. Fitzpatrick, Crawford, Ni, and Durieux-Smith (2011) reported that early language intervention in children who were moderately to severely hard of hearing, demonstrated normal outcomes in language proficiency by 4 to 5 years of age. Tomblin et al. (2015) reported that children who were fit with hearing aids by 6 months of age showed good levels of language development by age 2. Those whose hearing was not corrected until after 18 months showed lower language performance, even in the early preschool years. However, this study did reveal that those

whose hearing was corrected by toddlerhood had greatly improved language skills by age 6. The research on hearing-impaired children reveals that this critical period for language development is not exclusive to infancy and that the brain is still receptive to language development in early childhood. Fortunately, it has become routine to screen hearing in newborns, because when hearing loss is not treated early, it can delay spoken language, and literacy, and impact children's social skills (Moeller & Tomblin, 2015).

Learning Theory

Perhaps the most straightforward explanation of language development is that it occurs through the principles of learning, including association and reinforcement (Skinner, 1953). Additionally, Bandura (1977) described the importance of observation and imitation of others in learning language. There must be at least some truth to the idea that language is learned through environmental interactions or nurture. Children learn the language that they hear spoken around them rather than some other language. Also supporting this idea is the gradual improvement of language skills with time. It seems that children modify their language through imitation and reinforcement, such as parental praise and being understood. For example, when a two-year-old child asks for juice, he might say, "me juice," to which his mother might respond by giving him a cup of apple juice.

However, language cannot be entirely learned. For one, children learn words too fast for them to be learned through reinforcement. Between the ages of 18 months and 5 years, children learn up to 10 new words every day (Anglin, 1993). More importantly, language is more generative than it is imitative. Language is not a predefined set of ideas and sentences that we choose when we need them, but rather a system of rules and procedures that allows us to create an infinite number of statements, thoughts, and ideas, including those

that have never previously occurred. When a child says that she "swimmed" in the pool, for instance, she is showing generativity. No adult speaker of English would ever say "swimmed," yet it is easily generated from the normal system of producing language.

Other evidence that refutes the idea that all language is learned through experience comes from the observation that children may learn languages better than they ever hear them. Deaf children whose parents do not communicate using ASL very well nevertheless are able to learn it perfectly on their own and may even make up their own language if they need to (Goldin-Meadow & Mylander, 1998). A group of deaf children in a school in Nicaragua, whose teachers could not sign, invented a way to communicate through made-up signs (Senghas, Senghas, & Pyers, 2005). The development of this new Nicaraguan Sign Language has continued and changed as new generations of students have come to the school and started using the language. Although the original system was not a real language, it is becoming closer and closer every year, showing the development of a new language in modern times.

Social Pragmatics

Another view, **pragmatics**, emphasizes the very social nature of human language. Language from this view is not only a cognitive skill but also a social one. A language is a tool humans use to communicate, connect to, influence, and inform others. Most of all, language comes out of a need to cooperate. The social nature of language has been demonstrated by a number of studies that have shown that children use several pre-linguistic skills (such as pointing and other gestures) to communicate not only their own needs but what others may need. So, a child watching her mother search for an object may point to the object to help her mother find it. Eighteen-month to 30-month-olds have been shown to make linguistic repairs when it is clear that another person does not

understand them (Grosse, Behne, Carpenter & Tomasello, 2010). Grosse et al. (2010) found that even when the child was given the desired object if there had been any misunderstanding along the way (such as a delay in being handed the object, or the experimenter calling the object by the wrong name), children would make linguistic repairs. This would suggest that children are using language not only as a means of achieving some material goal, but to make themselves understood in the mind of another person.[15]

Language is not only a cognitive skill but also a social one.[16]

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Piaget's Theory

Jean Piaget's theory of language development suggests that children use both **assimilation** and **accommodation** to learn language. Assimilation is the process of changing one's environment to place information into an already-existing schema (or idea). Accommodation is the process of changing one's schema to adapt to the new environment. Piaget believed children need to first develop mentally before language acquisition can occur. According to him, children first create mental structures within the mind (schemas) and from these schemas, language development happens.

Vygotsky's theory

Lev Vygotsky's theory of language development focused on social learning and the **zone of proximal development** (ZPD). The ZPD is a level of development obtained when children engage in social interactions with others; it is the distance between a child's *potential* to learn and the *actual learning* that takes place. Vygotsky's theory also demonstrated that Piaget underestimated the importance of social interactions in the development of language.[17]

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Statistical Learning

Research in the last two decades has revealed powerful statistical learning abilities in infants, including the developing capacity to cull statistical regularities from a variety of auditory inputs (words) including artificial and natural language (e.g., Saffran et al., 1996a; Saffran et al., 1996b; Pelucchi et al., 2009). Given the richness and complexity of a language, how is it that infants acquire vocabulary and structure so rapidly, and seemingly effortlessly, in their first years after birth? For example, one challenge facing young language learners is the fact that speakers do not mark word boundaries with pauses, and infants must rely on other information to accomplish this task.

Researchers hypothesized that the statistical structure of a language might be important for word division (Harris, 1955; Hayes and Clark, 1970). Saffran et al. (1996a,b) proposed a mechanism for statistical word segmentation: **transitional probability** (TP) detection. In their experiments, adults, first-graders, and 8-month-olds were presented with a continuous stream of speech from an artificial language in which word boundaries were indicated by differing TPs between syllables *within words* (high TPs) and *across words* (low TPs). After brief exposure to this language, listeners in all three age groups were able to distinguish between high TP syllable sequences ("words") and low TP sequences ("part-words"). Thus, both infant and adult learners appeared sensitive to the TP information contained in the speech stream, suggesting that statistical learning via sensitivity to TPs is a possible mechanism contributing to language acquisition. [18]

18. Statistical learning across development: flexible yet constrained by Lauren Krogh Haley A. Vlach and Scott P. Johnson retrieved from Frontiers in Psychology licensed under CC-BY 3.0. (modified by Marie Parnes)[16] Human Language Development Boundless

Language and Cognition

It is easy to wonder which comes first, the thought or the language. Does an individual first think of an idea or did speaking, hearing, or reading about an idea spur a thought? Can thought exist without language? You might as well ask which came first, the chicken or the egg. Language and thought (or "cognition") tend to interact in a dual and cyclical relationship, a theory known overall as linguistic relativity. What one thinks becomes what one communicates, and what one communicates can lead to new thoughts. There are several different theories that aim to discuss the relationship between cognition and language, and each will be discussed in this chapter.

The Sapir-Whorf Hypothesis

The **Sapir-Whorf hypothesis** states that the grammatical structure of a person's language influences the way he or she perceives the world. The hypothesis has been largely abandoned by linguists as it has found at best very limited experimental support, and it does not hold much merit in psychology. For instance, studies have not shown that speakers of languages lacking a subjunctive mood (such as Chinese) experience difficulty with hypothetical problems. The weaker version of this theory does have some merit, however. For example, different words mean different things in different languages; not every word in every language has a one-to-one exact translation in a different language. Because of these small but important differences, using the wrong word within a particular

language (because you believe it to mean something else) can have dire consequences.

An example of studying linguistic relativity is in the area of color naming. Sapir and Whorf, as believers in linguistic relativity, would believe that people whose languages partition the color spectrum along different lines actually perceive colors in a different way. However, recent research has supported the idea that human color perception is governed more by biological and physical rather than linguistic constraints, regardless of how many color words a language has.

Cognitive-Behavioral Therapy

According to the theory that drives cognitive-behavioral therapy, the way a person thinks has a huge impact on what she or he says and does. Founded by Aaron T. Beck, this school of thought discusses the interplay among emotion, behavior, language, and thought. Since internal dialogue is a form of language, the way we speak to ourselves can influence our daily lives. Problems with our internal dialogue, known as cognitive distortions, can lead to negative behaviors and serious emotional problems.

Behavioral Economics

The field of behavioral economics studies the effect of psychological and cognitive factors on individuals' behavior in an economic context. In this field (and others), researchers have shown that the more vividly an event is described, the more likely people will believe it is true. Thus, people will draw different conclusions and

make different choices about a situation based on the language used to describe that situation.[19]

Components of Language

Phonemes and Phonology

A **phoneme** is *the smallest unit of sound that makes a meaningful difference in a language* and the study of phonemes is phonology. The word "bit" has three phonemes. In spoken languages, phonemes are produced by the positions and movements of the vocal tract, including our lips, teeth, tongue, vocal cords, and throat, whereas in sign languages phonemes are defined by the shapes and movement of the hands.

There are hundreds of unique phonemes that can be made by human speakers, but most languages only use a small subset of the possibilities. English contains about 45 phonemes, whereas other languages have as few as 15 and others more than 60. The Hawaiian language contains fewer phonemes as it includes only 5 vowels (a, e, i, o, and u) and 7 consonants (h, k, l, m, n, p, and w).

Infants are born able to detect all phonemes, but they lose their ability to do so as they get older; by 10 months of age, a child's ability to recognize phonemes becomes very similar to that of the adult speakers of the native language. Phonemes that were initially differentiated come to be treated as equivalent (Werker & Tees, 2002).

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Morphemes and Morphology

Morphology is the study of words and other meaningful units of languages like suffixes and prefixes. [20] Whereas phonemes are the smallest units of sound in language, a **morpheme** is *a string of one or more phonemes that makes up the smallest units of meaning in a language.* Some morphemes are prefixes and suffixes used to modify other words. For example, the syllable "re-" as in "rewrite" or "repay" means "to do again," and the suffix "-est" as in "happiest" or "coolest" means "to the maximum." [21]

Syntax

Syntax is the study of sentences and phrases, or how people put words into the right order so that they can communicate meaningfully. All languages have underlying rules of syntax, which, along with morphological rules, make up every language's grammar. An example of syntax coming into play in language is "Eugene walked the dog" versus "The dog walked Eugene." The order of words is not arbitrary—in order for the sentence to convey the intended meaning, the words must be in a certain order.

20. [17] Human Language Development Boundless Psychology. Curation and Revision provided by: Boundless.com licensed by CC BY-SA 4.0 (modified by Marie Parnes)
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Semantics

Semantics, most generally, is about the meaning of sentences. Someone who studies semantics is interested in words and what real-world object or concept those words denote, or point to.[22]

Pragmatics

The social side of language is expressed through **pragmatics**, or *how we communicate effectively and appropriately with others*. Examples of pragmatics include turn-taking, staying on topic, volume and tone of voice, and appropriate eye contact.

Lastly, words do not possess fixed meanings but change their interpretation as a function of the context in which they are spoken. We use contextual information, *the information surrounding language*, to help us interpret it. Examples of contextual information include our knowledge and nonverbal expressions, such as facial expressions, postures, and gestures. Misunderstandings can easily arise if people are not attentive to contextual information or if some of it is missing, such as it may be in newspaper headlines or in text messages.[23]

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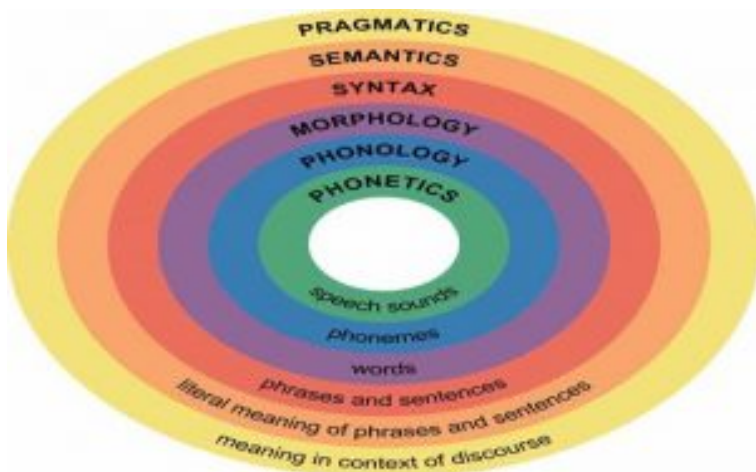
Major levels of linguistic structure [24]

24. Image retrieved from Human Language Development Boundless Psychology. Curation and Revision provided by: Boundless.com licensed by CC BY-SA 4.0[22] Lifespan Development: A Psychological Perspective 2nd Edition by Martha Lally and Suzanne Valentine-French is licensed under CC BY-NC-SA 3.0

The Developmental Progression of Language

Infancy and Toddlerhood

Do newborns communicate? Of course, they do. They do not, however, communicate with the use of oral language. Instead, they communicate their thoughts and needs with body posture (being relaxed or still), gestures, cries, and facial expressions. A person who spends adequate time with an infant can learn which cries indicate pain and which ones indicate hunger, discomfort, or frustration.

In terms of producing spoken language, babies begin to coo almost immediately. **Cooing** *is a one-syllable combination of a consonant and a vowel sound* (e.g., coo or ba). Interestingly, babies replicate sounds from their own languages. A baby whose parents speak French will coo in a different tone than a baby whose parents speak Spanish or Urdu. These gurgling, musical vocalizations can serve as a source of entertainment to an infant who has been laid down for a nap or seated in a carrier on a car ride. Cooing serves as practice for vocalization, as well as the infant hears the sound of his or her own voice and tries to repeat sounds that are entertaining. Infants also begin to learn the pace and pause of conversation as they alternate their vocalization with that of someone else and then take their turn again when the other person's vocalization has stopped.

At about four to six months of age, infants begin making even more elaborate vocalizations that include the sounds required for any language. Guttural sounds, clicks, consonants, and vowel sounds stand ready to equip the child with the ability to repeat whatever sounds are characteristic of the language heard. Eventually, these sounds will no longer be used as the infant grows more accustomed to a particular language.

At about 7 months, infants begin **babbling**, engaging in *intentional vocalizations that lack specific meaning and comprise a consonant-*

vowel repeated sequence, such as ma-ma-ma, da-da-da. Children babble as practice in creating specific sounds, and by the time they are a year old, the babbling uses primarily the sounds of the language that they are learning (de Boysson-Bardies, Sagart, & Durand, 1984). These vocalizations have a conversational tone that sounds meaningful even though it is not. Babbling also helps children understand the social, and communicative functions of language. Children who are exposed to sign language babble in sign by making hand movements that represent real language (Petitto & Marentette, 1991).

Children communicate information through **gesturing** long before they speak, and there is some evidence that gesture usage predicts subsequent language development (Iverson & Goldin-Meadow, 2005). Deaf babies also use gestures to communicate wants, reactions, and feelings. Because gesturing seems to be easier than vocalization for some toddlers, sign language is sometimes taught to enhance one's ability to communicate by making use of the ease of gesturing. The rhythm and pattern of language is used when deaf babies sign, just as it is when hearing babies babble.

At around ten months of age, the infant *can understand more than he or she can say, which is referred to as* **receptive language**. You may have experienced this phenomenon as well if you have ever tried to learn a second language. You may have been able to follow a conversation more easily than contribute to it. One of the first words that children understand is their own name, usually by about 6 months, followed by commonly used words like "bottle," "mama," and "doggie" by 10 to 12 months (Mandel, Jusczyk, & Pisoni, 1995). Infants shake their head "no" around 6–9 months, and they respond to verbal requests to do things like "wave bye-bye" or "blow a kiss" around 9–12 months. Children also use contextual information, particularly the cues that parents provide, to help them learn language. Children learn that people are usually referring to things that they are looking at when they are speaking (Baldwin, 1993), and that the speaker's emotional expressions are related to the content of their speech.

Children begin using their first words at about 12 or 13 months of age and may use partial words to convey thoughts at even younger ages. *These one-word expressions are referred to as* **holophrastic speech.** For example, the child may say "ju" for the word "juice" and use this sound when referring to a bottle. The listener must interpret the meaning of the holophrase, and when this is someone who has spent time with the child, interpretation is not too difficult. But, someone who has not been around the child will have trouble knowing what is meant. Imagine the parent who to a friend exclaims, "Ezra's talking all the time now!" The friend hears only "ju da ga" to which the parent explains means, "I want some milk when I go with Daddy."

The early utterances of children contain many errors, for instance, confusing /b/ and /d/, or /c/ and /z/. The words children create are often simplified, in part because they are not yet able to make the more complex sounds of the real language (Dobrich & Scarborough, 1992). Children may say "keekee" for kitty, "nana" for banana, and "vesketti" for spaghetti because it is easier. Often these early words are accompanied by gestures that may also be easier to produce than the words themselves. Children's pronunciations become increasingly accurate between 1 and 3 years, but some problems may persist until school age.

A child who learns that a word stands for an object may initially think that the *word can be used for only that particular object*, which is referred to as **underextension.** Only the family's Irish Setter is a "doggie", for example. More often, however, a child may think that *a label applies to all objects that are similar to the original object*, which is called **overextension.** For example, all animals become "doggies". The first error is often the result of children learning the meaning of a word in a specific context, while the second language error is a function of the child's smaller vocabulary.

If the child is using English, the first words tend to be nouns. The child labels objects such as cup, ball, or other items that they regularly interact with. In a verb-friendly language such as Chinese, however, children may learn more verbs. This may also be due to

the different emphasis given to objects based on culture. Chinese children may be taught to notice action and relationships between objects, while children from the United States may be taught to name an object and its qualities (color, texture, size, etc.). These differences can be seen when comparing interpretations of art by older students from China and the United States (Imai et al., 2008).

By the time they become toddlers, children have a vocabulary of about 50-200 words and begin putting those words together in telegraphic speech, such as "baby bye-bye" or "doggie pretty". Words needed to convey messages are used, but the articles and other parts of speech necessary for grammatical correctness are not yet used. These expressions sound like a telegraph, or perhaps a better analogy today would be that they read like a text message. **Telegraphic speech**, or text message speech, *occurs when unnecessary words are not used*. "Give baby ball" is used rather than "Give the baby the ball."

Why is a horse a "horsie"? Have you ever wondered why adults tend to use "baby talk" or that sing-song type of intonation and exaggeration used when talking to children? This represents a universal tendency and is known as **infant-directed speech.**

> Infants are more attuned to the tone of voice than to the content of words themselves.[25]

It involves exaggerating the vowel and consonant sounds, using a high-pitched voice, and delivering the phrase with great facial expression (Clark, 2009). Why is this done? Infants are frequently more attuned to the tone of voice of the person speaking than to the content of the words themselves and are aware of the target of speech. Werker, Pegg, and McLeod (1994) found that infants listened

25. Image retrieved from Pixabay.com is licensed under CC0.

longer to a woman who was speaking to a baby than to a woman who was speaking to another adult. Adults may use this form of speech in order to clearly articulate the sounds of a word so that the child can hear the sounds involved. It may also be because when this type of speech is used, the infant pays more attention to the speaker and this sets up a pattern of interaction in which the speaker and listener are in tune with one another.[26]

Early Childhood

Vocabulary Growth

In a classic paper, Carey (1978) made reference to young children's "word-learning wizardry." children learn 9 new words a day, every day, from about 18 months of age until about 6 years of age (when estimates suggest they will have amassed a vocabulary of roughly 14,000 words). This astounding feat has captured the imagination of researchers around the world, and countless studies have examined children's amazing ability to learn a large number of words within a relatively brief developmental period.

Carey (1978) estimated that a young child is working out the meanings of roughly 1,600 words at any given point in time. If we assume that it takes about 6 months to map out the full meaning of a word, then in order to get to that magic number of 14,000 words by age 6, children must have over 1,600 words under construction at a time. The full conceptual representation of a word may take months (perhaps years) to develop because each word is initially

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mapped onto only a partial understanding – that is, a placeholder. By "placeholder", we refer to a special kind of partial meaning that can change, or become elaborated with, increasing knowledge.

The initial process of establishing some sort of placeholder meaning for a word is termed **fast-mapping**; the more extended and challenging task of figuring out the rest of that representation is termed **extended-mapping**. Carey and Bartlett's (1978) classic "chromium" study provides an illustration of how fast-mapping falls short of extended-mapping. In their study, 3-year-olds learned a new word ("chromium") in the context of an object that was olive-green in color. One week after a single experience with the word, the participants displayed some recall of the word, some understanding of the concept (e.g., grasping that olive-green differs from forest green, even if originally they had merged the two into a single, undifferentiated "green" category), and some knowledge of the word's meaning (e.g., that it refers to a color). Importantly, however, these understandings were all incomplete. Children's recall of the word was partial at best (e.g., "crum" instead of chromium); their understanding of the concept (e.g., how olive-green relates to other colors) was improved relative to baseline (before exposure to the word) but far from perfect; and their knowledge of the word's meaning was imprecise (e.g., knowing that olive-green had a name, but not which name, or knowing that "chromium" referred to a color, but not which color). As these data suggest, fast-mapping is quick– but it is incomplete, and the resulting mapping is best construed as a placeholder, yet it is the partial nature of early meanings is that permits the rapid early learning of words.[27]

The parts of speech that are learned depend on the language

27. Fast-mapping placeholders: Using words to talk about kinds by Susan A. Gelman & Amanda C. Brandone is courtesy of U.S. National Library of Medicine – public domain (modified by Marie Parnes)

and what is emphasized. Children speaking verb-friendly languages such as Chinese and Japanese, tend to learn nouns more readily. But, those learning less verb-friendly languages such as English, seem to need assistance in grammar to master the use of verbs (Imai, et al, 2008).[28]

The use of constraints is another mechanism for increasing vocabulary. **Word learning constraints** are assumptions or biases that allow children to quickly rule out alternative meanings when learning a new word. They begin to manifest themselves around 18 months when children begin to rapidly expand their vocabulary. These biases are important for children with limited processing abilities if they are to be successful in word learning. These biases include the **whole object assumption**––the assumption that a word labels a whole object rather than part of an object; the **shape bias**––the bias to generalize a word to other objects with the same shape; the **taxonomic assumption**, or noun-category *bias*, under which a word is hypothesized to extend to other members of the same category (e.g., "dog" refers to the family dog and the neighbor's dog, rather than the family dog and thematically-related objects like bones); and **mutual exclusivity**, under which children assign a new word to an object and then assume there can only be one label for it.[29]

In addition to fast mapping and constraints, children will use other mechanisms called syntactic bootstrapping and semantic bootstrapping. **Syntactic bootstrapping** occurs when children use their knowledge of syntax to help them figure out what words mean**.** If a child hears an adult point to a strange object and say, "this is

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29. Word Learning Mechanisms by Angela Xiaoxue He and Sudha Arunachalam courtesy of U.S. National Library of Medicine – public domain

a dirb," they will infer that a "dirb" is a thing, but if they hear them say, "this is one of those dirb things" they will infer that it refers to the color or other characteristic of the object. And if they hear the word "dirbing," they will infer that "dirbing" is something that we do (Waxman, 1990). Waxman, S. R. (1990). [30] Research by Latisha Naigles (1990) concluded that toddlers are sensitive to syntactic cues. She presented two-year-olds with a video of two animals where a rabbit was doing something (i.e., an action) to a duck and a duck was doing something (i.e., an action) to a rabbit. One group received the sentence "The rabbit is gorping the duck" while the other received the sentence "The rabbit and the duck are gorping". When told to find gorping in two other pictures, they could correctly identify it given the syntactic form they were given (whether it was transitive or not). [31] **Semantic bootstrapping** refers to the hypothesis that children utilize their conceptual knowledge to create grammatical categories. Thus, for example, concepts like "type of object/person" map directly onto the linguistic category "noun" or concepts like "action" map onto the linguistic category "verb", etc. This will get children started on their way to acquiring parts of speech, which later can be supplemented by other linguistic information. The hypothesis received some support from the experiments that showed that three- to five-year-olds do, in fact, generally use nouns for things and verbs for actions more often than adults do. However, syntactic bootstrapping and learning from distributional patterns of the language have also been proposed as a way for children to acquire word classes. [32]

30. Beginning Psychology – Intelligence and Language by Charles Stangor is licensed under CC BY-NC-SA 3.0
31. Syntactic Bootstrapping and Learning New Words - lecture notes by Emma Jin were retrieved from MBHS Linguistics blog – public domain
32. semantic bootstrapping definition retrieved from Psychology wiki at wikia.org is licensed under CC BY-SA 3.0

Literal Meanings

Children can repeat words and phrases after having heard them only once or twice. But they do not always understand the meaning of the words or phrases. This is especially true of expressions or figures of speech that are taken literally. For example, two preschool-aged girls began to laugh loudly while listening to a tape-recording of Disney's "Sleeping Beauty" when the narrator reports, "Prince Phillip lost his head!" They imagine his head popping off and rolling down the hill as he runs and searches for it. Or a classroom full of preschoolers hears the teacher say, "Wow! That was a piece of cake!" The children began asking "Cake? Where is my cake? I want cake!"

Overregularization

Children learn rules of grammar as they learn language but may apply these rules inappropriately at first. For instance, a child learns to add "ed" to the end of a word to indicate past tense. Then form a sentence such as "I goed there. I doed that." This is typical at ages 2 and 3. They will soon learn new words such as "went" and "did" to be used in those situations.

The Impact of Training

Remember Vygotsky and the zone of proximal development? Children can be assisted in learning language by others who listen attentively, model more accurate pronunciations and encourage elaboration. The child exclaims, "I goed there!" and the adult responds, "You went there? Say, 'I went there.' Where did you go?" Children may be ripe for language as Chomsky suggests, but active participation in helping them learn is important for language

development as well. The process of scaffolding is one in which the adult (or more skilled peer) provides needed assistance to the child as a new skill is learned.

Language Development in Middle Childhood

Vocabulary

One of the reasons that children can classify objects in so many ways is that they have acquired a vocabulary to do so. By fifth grade, a child's vocabulary has grown to 40,000 words. It grows at a rate that exceeds that of those in early childhood. This language explosion, however, differs from that of younger children because it is facilitated by being able to associate new words with those already known, and because it is accompanied by a more sophisticated understanding of the meanings of a word.

New Understanding

Those in middle and late childhood are also able to think of objects in less literal ways. For example, if asked for the first word that comes to mind when one hears the word "pizza", the younger child is likely to say "eat" or some word that describes what is done with a pizza. However, the older child is more likely to place pizza in the appropriate category and say "food". This sophistication of vocabulary is also evidenced by the fact that older children tell jokes and delight in doing so. They may use jokes that involve plays on words such as "knock-knock" jokes or jokes with punch lines. Young children do not understand play on words and tell "jokes" that are

literal or slapstick, such as "A man fell down in the mud! Isn't that funny?"[33]

Grammar

Because all language obeys a set of combinatory rules, we can communicate an infinite number of concepts. While every language has a different set of rules, all languages do obey rules. These rules are known as grammar. Speakers of a language have internalized the rules and exceptions for that language's grammar. There are rules for every level of language—word formation (for example, native speakers of English have internalized the general rule that -ed is the ending for past-tense verbs, so even when they encounter a brand-new verb, they automatically know how to put it into past tense); phrase formation (for example, knowing that when you use the verb "buy," it needs a subject and an object; "She buys" is wrong, but "She buys a gift" is okay); and sentence formation.

Older children are also able to learn new rules of grammar with more flexibility. While younger children are likely to be reluctant to give up saying "I goed there", older children will learn this rather quickly along with other rules of grammar.

Context

Words do not possess fixed meanings but change their interpretation as a function of the context in which they are spoken. We use contextual information—the information surrounding

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language—to help us interpret it. Context is how everything within language works together to convey a particular meaning. Context includes tone of voice, body language, and the words being used. Depending on how a person says something, holds his or her body or emphasizes certain points of a sentence, a variety of different messages can be conveyed. For example, the word "awesome," when said with a big smile, means the person is excited about a situation. "Awesome," said with crossed arms, rolled eyes, and a sarcastic tone which means the person is not thrilled with the situation.[34]

Metalinguistic Awareness

Metalinguistic awareness is defined as the awareness and or understanding of the rules used to govern language. Patrick Hartwell points out how substantial it is for students to develop these capabilities, especially heightened **phonological awareness**: the detection and manipulation of sounds which is a key precursor to literacy. Research by Elizabeth McAllister (1989) has concluded that metalinguistic abilities are associated with cognitive development and is contingent on metalinguistic awareness- which relates to reading skill level, academic success and cultural environment that starts at infancy and continues through preschool. Therefore, an essential aspect to language development is focused on children being *aware* of language and the *components* of language. [35]

34. Child Growth and Development: An Open Educational Resources Publication by College of the Canyons by Jennifer Paris, Antoinette Ricardo, and Dawn Richmond is licensed under CC BY 4.0
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Language Development in Teenagers

Between the ages of 13 and 18 young people have learned the basics of language and they are constantly developing and improving their skills. Through these years they will learn many different ways they can use language which they have not had to do previously. Their language will continue to mature into adulthood. As children progress through middle school and high school, they continue to expand their vocabulary, refine their grammatical skills and write in more complexity as well as continue to develop reading comprehension skills.[36]

Literacy

Emergent literacy is a term that is used to explain a child's knowledge of reading and writing skills before they learn how to read and write words. It signals a belief that, in a literate society, young children—even one- and two-year-olds are in the process of becoming literate. Through the support of parents, caregivers, and educators, a child can successfully progress from emergent to conventional reading.

The basic components of emergent literacy include:

- Print motivation: Being interested in and enjoying books.
- Vocabulary: Knowing the names of things.
- Print awareness: Noticing print, knowing how to handle a book, and knowing how to follow words on a page.

36. Teenagers 13-18 retrieved from Sit for Kids a website of speech and language therapists. The website does not have a statement about terms of use.

- Narrative skills: Being able to describe things and events and to tell stories.
- Letter knowledge: Understanding letters are different from each other, knowing their names and sounds, and recognizing letters everywhere.
- Phonological awareness: Being able to hear and play with the smaller sounds in words.

Emergent literacy is of critical importance in early education in light of research showing that children learn skills that prepare them to read years before they start school.[37]

Reading

Cognitive developmental research has shown that **phonemic awareness**—that is, awareness of the component sounds within words—is a crucial skill in learning to read. To measure awareness of the component sounds within words, researchers ask children to decide whether two words rhyme, to decide whether the words start with the same sound, to identify the component sounds within words, and to indicate what would be left if a given sound were removed from a word. Kindergartners' performance on these tasks is the strongest predictor of reading achievement in third and fourth grade, even stronger than IQ or social class background (Nation, 2008). Moreover, teaching these skills to randomly chosen 4- and 5-year-olds results in their being better readers years later (National Reading Panel, 2000).

A huge milestone in middle childhood is learning to read and write. While the foundations of this were laid in infancy and early

37. Emergent Literacies retrieved from Psychology wiki at wikia.org is licensed under CC BY-SA 3.0

childhood, formal instruction on this process usually happens during the school-age years. There isn't always complete agreement on how children are best taught to read. The following approaches to teaching reading are separated by their methodology, but today, models of reading strive for a balance between the two types of reading methods because they are both recognized as essential for learning to read.

An approach based on **phonics** teaches reading by making sure children can understand letter-sound correspondences (how letters sound), automatically recognize familiar words, and decode unfamiliar words. This ability to break the code of reading allows children to read words they have never heard spoken before. On the other hand, the **whole-language** approach attempts to teach reading as naturally as possible. As the sounds of words don't have meaning, the focus is on reading words and sentences in context (such as real books), rather than learning the sounds and phonemes that make up words.[38]

Writing

Handwriting is a complex task that involves both visual–motor and cognitive skills (Rosenblum et al., 2010; Bara and Gentaz, 2011). This task is managed in during primary school. Although children begin to integrate visual and proprioceptive information by carrying out the tasks of copying shapes and letters (Daly et al., 2003) when they are preschoolers, it is during the school-age period that they learn to associate movements with the mental image of the letters, and

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to write from dictation, so becoming able to control the movements proactively (Meulenbroek and Van Galen, 1988). At the same time, practicing that ability during the school period allows the process of handwriting to become more and more automatic (Feder and Majnemer, 2007). The acquisition of handwriting also affects more advanced literacy skills, such as the ability to produce written texts, because children who are in trouble with the graphic design of the graphemes are also likely to have fewer resources for the planning of the text (Berninger et al., 1997). [39]

Bilingualism

Although monolingual speakers often do not realize it, the majority of children around the world are **bilingual**, *meaning that they understand and use two languages* (Meyers-Sutton, 2005). Even in the United States, which is a relatively monolingual society, more than 60 million people (21%) speak a language other than English at home (Camarota & Zeigler, 2014; Ryan, 2013). Children who are dual language learners are one of the fastest-growing populations in the United States (Hammer et al., 2014). They make up nearly 30% of children enrolled in early childhood programs, like Head Start. By the time they enter school, they are very heterogeneous in their language and literacy skills, with some children showing delays in being proficient in either one or both languages (Hammer et al., 2014). Hoff (2018) reports language competency is dependent

on the quantity, quality, and opportunity to use a language. Dual language learners may hear the same number of words and phrases (quantity) overall, as do monolingual children, but it is split between two languages (Hoff, 2018). Thus, in any single language, they may be exposed to fewer words. They will show higher expressive and receptive skills in the language they come to hear the most.

In addition, the quality of the languages spoken to the child may differ in bilingual versus monolingual families. Place and Hoff (2016) found that for many immigrant children in the United States, most of the English heard was spoken by a non-native speaker of the language. Finally, many children in bilingual households will sometimes avoid using the family's heritage language in favor of the majority language (DeHouwer, 2007, Hoff, 2018). A common pattern in Spanish-English homes is for the parents to speak to the child in Spanish, but for the child to respond in English. As a result, children may show little difference in the receptive skills between English and Spanish, but better expressive skills in English (Hoff, 2018).

There are several studies that have documented the advantages of learning more than one language in childhood for cognitive executive function skills. Bilingual children consistently outperform monolinguals on measures of inhibitory control, such as ignoring irrelevant information (Bialystok, Martin & Viswanathan, 2005). Studies also reveal an advantage for bilingual children on measures of verbal working memory (Kaushanskaya, Gross, & Buac, 2014; Yoo & Kaushanskaya, 2012) and non-verbal working memory (Bialystok, 2011). However, it has been reported that among lower SES populations the working memory advantage is not always found (Bonifacci, Giombini, Beloocchi, & Conteno, 2011).

There is also considerable research to show that being bilingual, either as a child or an adult, leads to greater efficiency in the word learning process. Monolingual children are strongly influenced by the mutual-exclusivity bias, *the assumption that an object has only a single name* (Kaushanskaya, Gross, & Buac, 2014). For example, a child who has previously learned the word car may be confused when this object is referred to as an automobile or sedan. Research

shows that monolingual children find it easier to learn the name of a new object than to acquire a new name for a previously labeled object. In contrast, bilingual children and adults show little difficulty with either task (Kaushanskaya & Marian, 2009). This finding may be explained by the experience bilinguals have in translating between languages when referring to familiar objects.[40]

Bilingualism and Cultural Differences in the Classroom

In 2013, approximately 20% of school-aged children and adolescents spoke a language other than English in the home (Camarota & Zeigler, 2014). The majority of bilingual students speak Spanish, but the rest represent more than three hundred different language groups from around the world. In larger communities throughout the United States, it is therefore common for a single classroom to contain students from several language backgrounds at once. In classrooms, as in other social settings, bilingualism exists in different forms and degrees. At one extreme are students who speak both English and another language fluently; at the other extreme are those who speak only limited versions of both languages. In between are students who speak their home (or heritage) language much better than English, as well as others who have partially lost their heritage language in the process of learning English (Tse, 2001). Commonly, a student may speak a language satisfactorily but be challenged by reading or writing it. Whatever the case, each bilingual student poses unique challenges to teachers.

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Students who are fluent in two languages have a cognitive advantage.[41]

The student who speaks both languages fluently has a definite cognitive advantage. As you might suspect, and research confirms, a fully fluent bilingual student is in a better position to express concepts or ideas in more than one way, and to be aware of doing so (Jimenez, Garcia, & Pearson, 1995; Francis, 2006). Unfortunately,

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the bilingualism of many students is unbalanced in the sense that they are either still learning English, or else they have lost some earlier ability to use their original, heritage language. Losing one's original language is a concern as research finds that language loss limits students' ability to learn English as well or as quickly as they could do. Having a large vocabulary in a first language has been shown to save time in learning vocabulary in a second language (Hansen, Umeda & McKinney, 2002). Preserving the first language is important if a student has impaired skills in all languages and therefore needs intervention or help from a speech-language specialist. Research has found, in such cases, that the specialist can be more effective if the specialist speaks and uses the first language as well as English (Kohnert, Yim, Nett, Kan, & Duran, 2005).

Cultures and ethnic groups differ not only in languages but also in how languages are used. Since some of the patterns differ from those typical of modern classrooms, they can create misunderstandings between teachers and students (Cazden, 2001; Rogers, et al., 2005). Consider these examples:

- In some cultures, it is considered polite or even intelligent not to speak unless you have something truly important to say. Chitchat, or talk that simply affirms a personal tie between people, is considered immature or intrusive (Minami, 2002). In a classroom, this habit can make it easier for a child to learn not to interrupt others, but it can also make the child seem unfriendly.
- Eye contact varies by culture. In many African American and Latin American communities, it is considered appropriate and respectful for a child not to look directly at an adult who is speaking to them (Torres-Guzman, 1998). In classrooms, however, teachers often expect a lot of eye contact (as in "I want all eyes on me!") and may be tempted to construe a lack of eye contact as a sign of indifference or disrespect.
- Social distance varies by culture. In some cultures, it is common to stand relatively close when having a conversation;

in others, it is more customary to stand relatively far apart (Beaulieu, 2004). Problems may happen when a teacher and a student prefer different social distances. A student who expects a closer distance than does the teacher may seem overly familiar or intrusive, whereas one who expects a longer distance may seem overly formal or hesitant.

- Wait time varies by culture. Wait time is the gap between the end of one person's comment or question and the next person's reply or answer. In some cultures, wait time is relatively long, as long as three or four seconds (Tharp & Gallimore, 1989). In others it is a negative gap, meaning that it is acceptable, even expected, for a person to interrupt before the end of the previous comment. In classrooms the wait time is customarily about one second; after that, the teacher is likely to move on to another question or to another student. A student who habitually expects a wait time longer than one second may seem hesitant and not be given many chances to speak. A student who expects a negative wait time, on the other hand, may seem overeager or even rude.

- In most non-Anglo cultures, questions are intended to gain information, and it is assumed that a person asking the question truly does not have the information requested (Rogoff, 2003). In most classrooms, however, teachers regularly ask test questions, which are questions to which the teacher already knows the answer and that simply assess whether a student knows the answer as well (Macbeth, 2003). The question: "How much is 2 2?" for example, is a test question. If the student is not aware of this purpose, he or she may become confused, or think that the teacher is surprisingly ignorant. Worse yet, the student may feel that the teacher is trying deliberately to shame the student by revealing the student's ignorance or incompetence to others.

- Preference for activities that are cooperative rather than competitive. Many activities in school are competitive, even when teachers try to de-emphasize the competition. Once

past the first year or second year of school, students often become attentive to who receives the highest marks on an assignment, for example, or who is the best athlete at various sports or whose contributions to class discussions get the most verbal recognition from the teacher (Johnson & Johnson, 1998). A teacher deliberately organizes important activities or assignments competitively, as in "Let's see who finishes the math sheet first". Classroom life can then become explicitly competitive, and the competitive atmosphere can interfere with cultivating supportive relationships among students or between students and the teacher (Cohen, 2004). For students who give priority to these relationships, competition can seem confusing at best and threatening at worst. A student may wonder, "What sort of sharing or helping with answers is allowed?" The answer to this question may be different depending on the cultural background of the student and teacher. What the student views as cooperative sharing may be seen by the teacher as laziness, freeloading, or even cheating.

Speech and Language Disorders

Aphasia

A loss of the ability to produce or understand language is referred to as **aphasia**. Without the brain, there would be no language. The human brain has a few areas that are specific to language processing and production. When these areas are damaged or injured, capabilities for speaking or understanding can be lost, a disorder known as aphasia. These areas must function together in order for a person to develop, use, and understand language.

Articulation Disorders

An **articulation disorder** refers to the inability to correctly produce speech sounds (phonemes) because of imprecise placement, timing, pressure, speed, or flow of movement of the lips, tongue, or throat (NIDCD, 2016). Sounds can be substituted, left off, added or changed. These errors may make it hard for people to understand the speaker. They can range from problems with specific sounds, such as lisping to severe impairment in the phonological system. Most children have problems pronouncing words early on while their speech is developing. However, by age three, at least half of what a child says should be understood by a stranger. By age five, a child's speech should be mostly intelligible. Parents should seek help if by age six the child is still having trouble producing certain sounds. It should be noted that accents are not articulation disorders (Medline Plus, 2016a).

Fluency disorders

Fluency disorders affect the rate of speech. Speech may be labored and slow, or too fast for listeners to follow. The most common fluency disorder is stuttering. **Stuttering** is a speech disorder in which sounds, syllables, or words are repeated or last longer than normal. These problems cause a break in the flow of speech, which is called dysfluency (Medline Plus, 2016b). About 5% of young children, aged two-five, will develop some stuttering that may last from several weeks to several years (Medline Plus, 2016c). Approximately 75% of children recover from stuttering. For the remaining 25%, stuttering can persist as a lifelong communication disorder (National Institute on Deafness and other Communication Disorders, NIDCD, 2016). This is called developmental stuttering and is the most common form of stuttering. Brain injury, and in very rare

instances, emotional trauma may be other triggers for developing problems with stuttering. In most cases of developmental stuttering, other family members share the same communication disorder. Researchers have recently identified variants in four genes that are more commonly found in those who stutter

Voice Disorders

Voice disorders involve problems with pitch, loudness, and quality of the voice (American Speech-Language and Hearing Association, 2016). It only becomes a disorder when problems with the voice make the child unintelligible. In children, voice disorders are significantly more prevalent in males than in females. Between 1.4% and 6% of children experience problems with the quality of their voice. Causes can be due to structural abnormalities in the vocal cords and/or larynx, functional factors, such as vocal fatigue from overuse, and in rarer cases psychological factors, such as chronic stress and anxiety.[42]

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10. Emotional Development and Attachment

Emotional Development

As we move through our daily lives, we experience a variety of emotions. An **emotion** is a subjective state of being that we often describe as our feelings. Emotions result from the combination of subjective experience, expression, cognitive appraisal, and

physiological responses (Levenson, Carstensen, Friesen, & Ekman, 1991). An emotion often begins with a subjective (individual) experience, which is a stimulus. Often the stimulus is external, but it can also be an internal one. For example, if a child thinks about losing a treasured toy, he or she may become sad even though they still have possession of the toy. **Emotional expression** refers to the way one displays an emotion and includes nonverbal and verbal behaviors (Gross, 1999).[1]

Emotional Development in Infancy

Emotions are often divided into two general categories: **Basic emotions** (primary emotions), such as interest, happiness, anger, fear, surprise, sadness, and disgust, which appear first, and **self-conscious emotions** (secondary emotions), such as envy, pride, shame, guilt, doubt, and embarrassment. Unlike primary emotions, secondary emotions appear as children start to develop a self-concept, and require social instruction on when to feel such emotions. The situations in which children learn self-conscious emotions vary from culture to culture. Individualistic cultures teach us to feel pride in personal accomplishments, while in more collective cultures children are taught to not call attention to themselves unless they wish to feel embarrassed for doing so (Akimoto & Sanbinmatsu, 1999).[2]

At birth, infants exhibit two emotional responses: attraction and

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withdrawal. They show attraction to pleasant situations that bring comfort, stimulation, and pleasure, and they withdraw from unpleasant stimulation such as bitter flavors or physical discomfort. At around two months, infants exhibit social engagement in the form of social smiling as they respond with smiles to those who engage their positive attention (Lavelli & Fogel, 2005).

Social Smiling is a form of communication. [3]

Social smiling becomes more stable and organized as infants learn to use their smiles to engage their parents in interactions. Pleasure is expressed as laughter at 3 to 5 months of age, and displeasure becomes more specific as fear, sadness, or anger between ages 6 and 8 months. Anger is often the reaction to being prevented from

3. CC0 Public Domain

obtaining a goal, such as a toy being removed (Braungart-Rieker, Hill-Soderlund, & Karrass, 2010). In contrast, sadness is typically the response when infants are deprived of a caregiver (Papousek, 2007). Fear is often associated with the presence of a stranger, known as **s**tranger wariness or **stranger anxiety**, or the departure of significant others known as **separation anxiety.** Both appear sometime between 6 and 15 months after object permanence has been acquired. Further, there is some indication that infants may experience jealousy as young as 6 months of age (Hart & Carrington, 2002).

Social influences and the development of emotions

Facial expressions of emotion are important regulators of social interaction. In the developmental literature, this concept has been investigated under the concept of **social referencing**; that is, the process whereby infants seek out information from others to clarify a situation and then use that information to act (Klinnert, Campos, & Sorce, 1983). To date, the strongest demonstration of social referencing comes from work on the **visual cliff**. In the first study to investigate this concept, Campos and colleagues (Sorce, Emde, Campos, & Klinnert, 1985) placed mothers on the far end of the "cliff" from the infant. Mothers first smiled to the infants and placed a toy on top of the safety glass to attract them; infants invariably began crawling toward their mothers. When the infants were in the center of the table, however, the mother then posed an expression of fear, sadness, anger, interest, or joy. The results were clearly different for the different faces; no infant crossed the table when the mother showed fear; only 6% did when the mother posed anger, 33% crossed when the mother posed sadness, and approximately 75% of the infants crossed when the mother posed joy or interest.

This mother is encouraging her child to crawl across the visual cliff. The child hesitates to move forward as they see the transparent surface.[4]

Other studies provide similar support for facial expressions as regulators of social interaction. Researchers posed facial expressions of neutral, anger, or disgust toward babies as they moved toward an object and measured the amount of inhibition the babies showed in touching the object (Bradshaw, 1986). The

4. Image from wikipedia.org is licensed under Creative Commons Attribution-ShareAlike License

results for 10- and 15-month-olds were the same: Anger produced the greatest inhibition, followed by disgust, with neutral the least. This study was later replicated using joy and disgust expressions, altering the method so that the infants were not allowed to touch the toy (compared with a distractor object) until one hour after exposure to the expression (Hertenstein & Campos, 2004). At 14 months of age, significantly more infants touched the toy when they saw joyful expressions, but fewer touched the toy when the infants saw disgust.[5]

As infants and toddlers interact with other people, their social and emotional skills continue to develop throughout childhood.[6]

Empathy

A person can acquire emotions, such as anger and happiness, from people around him or her. This process is called **emotional contagion**, whereby emotional expression of a person leads another person to experience a similar emotional state (Bruder et al., 2012; Peters and Kashima, 2015). A component of emotional contagion, **emotional mimicry**, is defined as the imitation of the facial, verbal, or postural expressions of others (Hatfield et al.,

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1993; Hess and Fischer, 2013). For example, newborn babies will cry when they hear others crying.[7]

During childhood, the development of **empathy** is a crucial part of emotional and social development in childhood. The ability to identify with the feelings of another person helps in the development of prosocial (socially positive) and altruistic (helpful, beneficent, or unselfish) behavior. Altruistic behavior occurs when a person does something in order to benefit another person without expecting anything in return. Empathy helps a child develop positive peer relationships; it is affected by a child's temperament, as well as by parenting style. Children raised in loving homes with affectionate parents are more likely to develop a sense of empathy and altruism, whereas those raised in harsh or neglectful homes tend to be more aggressive and less kind to others.[8]

Empathy begins to increase in adolescence and is an important component of social problem solving and conflict avoidance. According to one longitudinal study, levels of cognitive empathy begin rising in girls around 13 years old, and around 15 years old in boys (Van der Graaff et al., 2013). Teens who reported having supportive fathers with whom they could discuss their worries were found to be better able to take the perspective of others (Miklikowska, Duriez, & Soenens, 2011).[9]

7. Matching Your Face or Appraising the Situation: Two Paths to Emotional Contagion by Huan Deng and Ping Hu retrieved from Frontiers in Psychology licensed under **CC-BY 3.0**. (modified by Marie Parnes)
8. Socioemotional Development in Childhood Boundless Psychology. Curation and Revision. Provided by: Boundless.com licensed by CC BY-SA 4.0
9. Psychology2e from Openstax licensed under CC BY 4.0

Temperament

Perhaps you have spent time with a number of infants. How were they alike? How did they differ? How do you compare with your siblings or other children you have known well? You may have noticed that some seemed to be in a better mood than others and that some were more sensitive to noise or more easily distracted than others. These differences may be attributed to temperament. **Temperament** *is the innate characteristics of the infant, including mood, activity level, and emotional reactivity, noticeable soon after birth.*

In a 1956 landmark study, Chess and Thomas (1996) evaluated 141 children's temperaments based on parental interviews. Referred to as the New York Longitudinal Study, infants were assessed on 9 dimensions of temperament including:

- Activity level, rhythmicity (regularity of biological functions),
- approach/withdrawal (how children deal with new things),
- adaptability to situations
- intensity of reactions
- threshold of responsiveness (how intense a stimulus has to be for the child to react)
- quality of mood
- distractibility
- attention span
- persistence.

Based on the infants' behavioral profiles, they were categorized into three general types of temperament:

- **Easy Child** (40%) who is able to quickly adapt to a routine and new situations, remains calm, is easy to soothe, and usually is in a positive mood.
- **Difficult Child** (10%) who reacts negatively to new situations, has trouble adapting to routine, is usually negative in mood,

and cries frequently.

- **Slow-to-Warm-Up Child** (15%) has a low activity level, adjusts slowly to new situations, and is often negative in mood.

As can be seen, the percentages do not equal 100% as some children were not able to be placed neatly into one of the categories. Think about how you might approach each type of child in order to improve your interactions with them. An easy child will not need much extra attention, while a slow-to-warm-up child may need to be given advance warning if new people or situations are going to be introduced. A difficult child may need to be given extra time to burn off their energy. A caregiver's ability to work well and accurately read the child will enjoy a **goodness-of-fit,** *meaning their styles match and communication and interaction can flow.* Parents who recognize each child's temperament and accept it will nurture more effective interactions with the child and encourage more adaptive functioning. For example, an adventurous child whose parents regularly take her outside on hikes would provide a good "fit" for her temperament.

Parenting is bidirectional: Not only do parents affect their children, but children also influence their parents. Child characteristics, such as temperament, affect parenting behaviors and roles. For example, an infant with an easy temperament may enable parents to feel more effective, as they are easily able to soothe the child and elicit smiling and cooing. On the other hand, a cranky or fussy infant elicits fewer positive reactions from his or her parents and may result in parents feeling less effective in the parenting role (Eisenberg et al., 2008). Over time, parents of more difficult children may become more punitive and less patient with their children (Clark, Kochanska, & Ready, 2000; Eisenberg et al., 1999; Kiff, Lengua, & Zalewski, 2011). Parents who have a fussy, difficult child are less satisfied with their marriages and have greater challenges in balancing work and family roles (Hyde, Else-Quest, & Goldsmith, 2004). Thus, child temperament is one of the

child characteristics that influence how parents behave with their children.

Temperament does not change dramatically as we grow up, but we may learn how to work around and manage our temperamental qualities. Temperament may be one of the things about us that stays the same throughout development. In contrast, **personality** is the result of the continuous interplay between biological disposition and experience.

Personality also develops from temperament in other ways (Thompson, Winer, & Goodvin, 2010). As children mature biologically, temperamental characteristics emerge and change over time. A newborn is not capable of much self-control, but as brain-based capacities for self-control advance, temperamental changes in self-regulation become more apparent. For example, a newborn who cries frequently does not necessarily have a grumpy personality; over time, with sufficient parental support and an increased sense of security, the child might be less likely to cry.

In addition, personality is made up of many other features besides temperament. Children's developing self-concept, their motivations to achieve or to socialize, their values and goals, their coping styles, their sense of responsibility and conscientiousness, and many other qualities are encompassed in personality. These qualities are influenced by biological dispositions, but even more by the child's experiences with others, particularly in close relationships, that guide the growth of individual characteristics. Indeed, personality development begins with the biological foundations of temperament but becomes increasingly elaborated, extended, and refined over time. The newborn that parents gazed upon becomes an adult with a personality of depth and nuance.[10]

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Emotional Regulation and Self Control

A final emotional change is in self-regulation. **Emotional self-regulation** refers to strategies we use to control our emotional states so that we can attain goals (Thompson & Goodvin, 2007). This requires effortful control of emotions and initially requires assistance from caregivers (Rothbart, Posner, & Kieras, 2006). Young infants have very limited capacity to adjust their emotional states and depend on their caregivers to help soothe themselves. Caregivers can offer distractions to redirect the infant's attention and provide comfort to reduce emotional distress. As areas of the infant's prefrontal cortex continue to develop, infants can tolerate more stimulation. By 4 to 6 months, babies can begin to shift their attention away from upsetting stimuli (Rothbart et al, 2006). Older infants and toddlers can more effectively communicate their need for help and can crawl or walk toward or away from various situations (Cole, Armstrong, & Pemberton, 2010). This aids in their ability to self-regulate. Temperament also plays a role in children's ability to control their emotional states, and individual differences have been noted in the emotional self-regulation of infants and toddlers (Rothbart & Bates, 2006).[11]

It is in early childhood that we see the start of **self-control**, a process that takes many years to fully develop. According to Lecci & Magnavita (2013), "Self-regulation is the process of identifying a goal or set of goals and, in pursuing these goals, using both internal (e.g., thoughts and affect) and external (e.g., responses of anything or anyone in the environment) feedback to maximize goal attainment" (p. 6.3). Self-regulation is also known as willpower. When we talk

11. Lifespan Development: A Psychological Perspective 2nd Edition by Martha Lally and Suzanne Valentine-French is licensed under CC BY-NC-SA 3.0[11] Marshmallow Test Image retrieved from wiki How licensed under CC BY-NC-SA 3.0

about willpower, we tend to think of it as the ability to delay gratification. For example, Bettina's teenage daughter made strawberry cupcakes, and they looked delicious. However, Bettina forfeited the pleasure of eating one, because she is training for a 5K race and wants to be fit and do well in the race. Would you be able to resist getting a small reward now in order to get a larger reward later? This is the question **Walter Mischel** investigated in his now-classic "**marshmallow test**."

Can this child delay gratification for a larger reward?
[12]

Mischel designed a study to assess self-regulation in young

12. Psychology2e from Openstax licensed under CC BY 4.0

children. In the marshmallow study, Mischel and his colleagues placed a preschool child in a room with one marshmallow on the table. The child was told that he could either eat the marshmallow now or wait until the researcher returned to the room and then he could have two marshmallows (Mischel, Ebbesen & Raskoff, 1972). This was repeated with hundreds of preschoolers. What Mischel and his team found was that young children differ in their degree of **self-control**. Mischel and his colleagues continued to follow this group of preschoolers through high school, and what do you think they discovered? The children who had more self-control in preschool (the ones who waited for the bigger reward) were more successful in high school. They had higher SAT scores, had positive peer relationships, and were less likely to have substance abuse issues; as adults, they also had more stable marriages (Mischel, Shoda, & Rodriguez, 1989; Mischel et al., 2010). On the other hand, those children who had poor self-control in preschool (the ones who grabbed the one marshmallow) were not as successful in high school, and they were found to have academic and behavioral problems.[13]

Emotional intelligence

The concept of emotional intelligence was introduced in the 60s and rose in popularity with the release of Daniel Goleman's 1995 book *Emotional Intelligence – Why it can matter more than IQ.*[14]

Emotional Intelligence (EI) can be generally defined as how we perceive, communicate, regulate, and understand our own emotions, as well as the emotions of others. According to Lane (2000a), the most pivotal aspect of EI is probably related to the

13. Psychology2e from Openstax licensed under CC BY 4.0
14. Emotional Intelligence by Lyndsay T Wilson retrieved from Explorable is licensed under CC BY 4.0

awareness of emotional experiences in oneself and others. Investigations of EI in children have suggested that a higher EI level appears to be an important predictive factor of health-related outcomes, such as improved wellbeing and social interactions during development (Andrei et al., 2014), as well as fewer somatic complaints (e.g., Jellesma et al., 2011). EI appears to have a positive impact on children's adaptive capacities (Mavroveli et al., 2008; Davis and Humphrey, 2012). A number of studies on EI through childhood have been conducted within educational settings; showing that EI can be important for positive adaptation within the classroom, with particular implications for social-emotional competencies and for consequent adaptive behaviors with peers (Frederickson et al., 2012). For instance, Petrides et al. (2004) showed that pupils with high EI scores were less likely to be expelled from their schools and had a lower frequency of unauthorized absences. Additional studies revealed that high EI scores were positively associated with multiple peer ratings for prosocial behavior (Mavroveli et al., 2009). Moreover, data from self-report surveys revealed that a high EI is negatively related to bullying (Mavroveli and Sánchez-Ruiz, 2011), and victimization attitude (Kokkinos and Kipritsi, 2012), and behavioral problems in general (Poulou, 2014). Although the literature still lacks clear and direct results regarding this relationship (Mavroveli et al., 2009; Hansenne and Legrand, 2012), it seems that EI may moderate the relationship between intelligence and scholastic performance (Agnoli et al., 2012). Overall, high EI (especially in the ability to regulate emotions) is associated with several positive outcomes for children. [15]

15. The Relationship Between Trait Emotional Intelligence, Cognition, and Emotional Awareness: An Interpretative Model by Sergio Agnoli, Giacomo Mancini, Federica Andrei, and Elena Trombini retrieved from Frontiers in Psychology is licensed under CC BY-4.0. (modified by Marie Parnes)

Emotional Disorders

Many children have fears and worries and may feel sad and hopeless from time to time. Strong fears may appear at different times during development. For example, toddlers are often very distressed about being away from their parents, even if they are safe and cared for. Although some fears and worries are typical in children, persistent or extreme forms of fear and sadness could be due to anxiety or depression.[16]

Mental health disorders are diagnosed by a qualified professional using the Diagnostic and Statistical Manual of Mental Disorders (DSM). This is a manual that is used as a standard across the profession for diagnosing and treating mental disorders.[17]

16. https://www.cdc.gov/childrensmentalhealth/features/anxiety-depression-children.html
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Persistent or extremem forms of fear and sadness could could be due to anxiety or depression.[18]

Depression

Occasionally being sad or feeling hopeless is a part of every child's life. However, some children feel sad or uninterested in things that they used to enjoy, or feel helpless or hopeless in situations where

18. Image retrieved from Pixabay.com are licensed under CC0.

they could do something to address the situations. When children feel persistent sadness and hopelessness, they may be diagnosed with **Major Depressive Disorder** (MDD).[19]

We now know that youth who have depression may show signs that are slightly different from the typical adult symptoms of depression. Children who are depressed may complain of feeling sick, refuse to go to school, cling to a parent or caregiver, feel unloved, hopeless about the future, or worry excessively that a parent may die. Older children and teens may sulk, get into trouble at school, be negative or grouchy, are irritable, indecisive, have trouble concentrating, or feel misunderstood. Because normal behaviors vary from one childhood stage to another, it can be difficult to tell whether a child who shows changes in behavior is just going through a temporary "phase" or is suffering from depression.[20]

Younger children with depression may pretend to be sick, refuse to go to school, cling to a parent, or worry that a parent may die.[21] Although MDD can be diagnosed in younger children, it is not very common[22]

Older children and teens with depression may get into trouble at school, sulk, and be irritable. Teens with depression may have symptoms of other disorders, such as anxiety, eating disorders, or

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substance abuse.[23] However, it is the first cause of disability among adolescents aged 10 to 19 years (WHO 2014). Suicide is the third cause of death in this age group, and adolescent depression is a major risk factor for suicide. Depressed adolescents experienced significantly more stressors during the year before onset when compared with a comparable 12-month period in normal controls.[24]

Anxiety

Many children have fears and worries and may feel sad and hopeless from time to time. Strong fears may appear at different times during development. For example, toddlers are often very distressed about being away from their parents, even if they are safe and cared for. Although fears and worries are typical in children, persistent or extreme forms of fear and sadness could be due to anxiety or depression. Because the symptoms primarily involve thoughts and feelings, they are called internalizing disorders.

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24. Depression in Children by Ali J. Alsaad; Yusra Azhar; Yasser Al Nasser retrieved from NCBI.NLM.NIH.gov is public domain (modified by Marie Parnes)

Internalizing disorders involve thoughts and feelings.[25]

When a child does not outgrow the fears and worries that are typical in young children, or when there are so many fears and worries that they interfere with school, home, or play activities, the child may be diagnosed with an **anxiety disorder**. Examples of different types of anxiety disorders include:

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- Being very afraid when away from parents (**separation anxiety**)
- Having extreme fear about a specific thing or situation, such as dogs, insects, or going to the doctor (phobia)
- Being very afraid of school and other places where there are people (**social anxiety**)
- Being very worried about the future and about bad things happening (**general anxiety**)
- Having repeated episodes of sudden, unexpected, intense fear that come with symptoms like heart pounding, having trouble breathing, or feeling dizzy, shaky, or sweaty (**panic disorder**)

Anxiety may present as fear or worry, but can also make children irritable and angry. Anxiety symptoms can also include trouble sleeping, as well as physical symptoms like fatigue, headaches, or stomachaches. Some anxious children keep their worries to themselves and, thus, the symptoms can be missed.[26]

Treatment for anxiety and depression

The first step to treatment is to have the child evaluated by a healthcare provider or a mental health specialist. The American Academy of Child and Adolescent Psychiatry (AACAP) recommends that healthcare providers routinely screen children for behavioral and mental health concerns. Some of the signs and symptoms of anxiety or depression in children could be caused by other conditions, such as trauma. It is important to get a careful evaluation to get the best diagnosis and treatment.

Consultation with a health provider can help determine if

26. Anxiety and Depression in Children retrieved from CDC.Gov – public domain

medication should be part of the treatment. [27] It is important to note that although antidepressants can be effective for many people, they may present serious risks to some, especially children, teens, and young adults. Antidepressants may cause some people, to have suicidal thoughts or make suicide attempts. [28]

A mental health professional can develop a therapy plan that works best for the child and family. **Behavior therapy** includes child therapy, family therapy, or a combination of both. The school can also be included in the treatment plan. For very young children, involving parents in treatment is key. **Cognitive-behavioral therapy** is one form of therapy that is used to treat anxiety or depression, particularly in older children. It helps the child change negative thoughts into more positive, effective ways of thinking, leading to more effective behavior. Behavior therapy for anxiety may involve helping children cope with and manage anxiety symptoms while gradually exposing them to their fears so as to help them learn that bad things do not occur. [29]

Disruptive, Impulse-Control, and Conduct Disorders

In 2013, the 5th revision to the DSM (DSM-5) added a chapter on disruptive, impulse-control, and conduct disorders. It brings together several disorders that were previously included in other chapters (such as oppositional defiant disorder, conduct disorder, intermittent explosive disorder, pyromania, and kleptomania) into

27. Anxiety and Depression in Children retrieved from CDC.Gov is public domain
28. Depression Basics from NIMH.NIH.gov is public domain
29. Anxiety and Depression in Children retrieved from CDC.Gov is public domain

one single category. These disorders are marked by behavioral and emotional disturbances specifically related to self-control.

Conduct Disorder

Conduct disorder (CD) is a psychological disorder diagnosed in childhood or adolescence that presents itself through a repetitive and persistent pattern of behavior in which the basic rights of others, or major age-appropriate norms, are violated. These behaviors are often referred to as "antisocial behaviors." It is often seen as the precursor to antisocial personality disorder, which is not diagnosed until the individual is 18 years old. The child diagnosed with CD often presents with a lack of empathy, or the ability to recognize the feelings of others.

CD is diagnosed in the DSM-5 based on a prolonged pattern of antisocial behavior such as serious violation of laws and social norms and rules. According to DSM-5 criteria, there are four categories that could be present in the child's behavior: *aggression to people and animals*, *destruction of property*, *deceitfulness or theft*, and *serious violation of rules*. Almost all adolescents who have a substance use disorder also have conduct disorder-like traits; therefore it is important to exclude a substance-induced cause before diagnosing CD.

The most effective treatment for an individual with conduct disorder is one that seeks to integrate individual, school, and family settings. Additionally, treatment should also seek to address familial conflicts such as marital discord or maternal depression. In this manner, a treatment would serve to address many of the possible triggers of conduct problems. Several treatments currently exist, the most effective of which is multi-systemic treatment (MST), an intensive, integrative treatment that emphasizes how an individual's conduct problems fit within a broader context.

Oppositional Defiant Disorder

Oppositional defiant disorder (ODD) involves patterns of anger, irritability, argumentative or defiant behavior, and/or vindictiveness. Unlike children with conduct disorder (CD), children with oppositional defiant disorder are *not* aggressive toward people or animals, do not destroy property, and do not show a pattern of theft or deceit.

Symptoms of ODD are of three types: *angry/irritable mood*, *argumentative/defiant behavior*, and *vindictiveness.* For a child or adolescent to qualify for a diagnosis of ODD, behaviors must cause considerable distress for the family or interfere significantly with academic or social functioning. Interference might take the form of preventing the child or adolescent from learning at school or making friends or placing him or her in harmful situations. These behaviors must also persist for at least six months. Effects of ODD can be greatly amplified by the presence of other disorders such as ADHD, depression, or substance use disorders.

Many pregnancies and birth problems are related to the development of conduct problems; however, strong evidence for causation is lacking. Malnutrition, specifically protein deficiency, lead poisoning, and a mother's use of nicotine, marijuana, alcohol, or other substances during pregnancy may increase the risk of developing ODD. Deficits and injuries to certain areas of the brain can also lead to serious behavioral problems in children. Brain imaging studies have suggested that children with ODD may have subtle differences in the part of the brain responsible for reasoning, judgment, and impulse control.

Approaches to the treatment of ODD include parent management training, individual psychotherapy, family therapy, cognitive-behavioral therapy, and social skills training. According to the American Academy of Child and Adolescent Psychiatry, treatments for ODD are tailored specifically to the individual child, and different treatment techniques are applied for pre-schoolers and adolescents. Several preventative programs have had a positive

effect on those at high risk for ODD. Both home visitation and programs such as Head Start have shown some effectiveness in preschool children. Social skills training, parent management training, and anger management programs have been used as prevention programs for school-age children at risk for ODD. For adolescents at risk for ODD, cognitive interventions, vocational training, and academic tutoring have shown preventative effectiveness.[30]

Prolonged defiance and argumentative behaviors are some signs of ODD. [31]

30. Psychological Disorders retrieved from, Boundless Psychology / Curation and Revision: Provided by: Boundless.com licensed by CC BY-SA 4.0
31. Image retrieved from Pixabay - public domain (CC0)

Intermittent Explosive Disorder

Intermittent explosive disorder (IED) is a behavioral disorder characterized by explosive outbursts of anger, often to the point of rage, that are disproportionate to the situation at hand (e.g., impulsive screaming triggered by relatively inconsequential events). Impulsive aggression is unpremeditated and is defined by a disproportionate reaction to any provocation, real or perceived. The disorder itself is not easily characterized and often exhibits comorbidity with other mood disorders, particularly bipolar disorder. Individuals diagnosed with IED report their outbursts as being brief (lasting less than an hour), with a variety of bodily symptoms (sweating, stuttering, chest tightness, twitching, palpitations) reported by a third of one sample. Aggressive acts are frequently reported accompanied by a sensation of relief and in some cases pleasure but often followed by later remorse.

The current DSM-5 criteria for a diagnosis of IED include recurrent outbursts that demonstrate an inability to control impulses. These can either include verbal aggression (tantrums, verbal arguments, or fights) or physical aggression that occurs twice in a week-long period for at least three months and does not lead to the destruction of property or physical injury; *or* three outbursts that involve injury or destruction within a year-long period.

In addition, the person must experience aggressive behavior that is grossly disproportionate to the magnitude of the psychosocial stressors. The outbursts cannot be premeditated and must cause distress or impairment of functioning, or lead to financial or legal consequences. The diagnosis can only be given to individuals 6 years of age or older, and the recurrent outbursts cannot be explained by another mental disorder and are not the result of another medical disorder or substance use.

Impulsive behavior, and especially impulsive violence predisposition, has been correlated to differences in levels of serotonin in the brain. IED may also be associated with lesions in the prefrontal cortex, with damage to these areas, including

the amygdala, increasing the incidence of impulsive and aggressive behavior and the inability to predict the outcomes of an individual's own actions. Lesions in these areas are also associated with improper blood sugar control, leading to decreased brain function in these areas, which are associated with planning and decision making.

Treatments are often attempted through both cognitive behavioral therapy and psychotropic medication regimens, though the pharmaceutical options have shown limited success. Therapy aids in helping the patient recognize the impulses in hopes of achieving a level of awareness and control of the outbursts, along with treating the emotional stress that accompanies these episodes.

Other Impulse-Control Disorders

In addition to those listed above, the DSM-5 lists several other impulse-control disorders under this chapter. **Pyromania** is characterized by impulsive and repetitive urges to deliberately start fires. Studies done on children and adolescents suffering from pyromania have reported its prevalence to be between 2.4%-3.5% in the United States. Kleptomania is characterized by an impulsive urge to steal purely for the sake of gratification. In the U.S. the presence of **kleptomania** is unknown but has been estimated at around 6 per 1,000 individuals. [32]

32. Psychological Disorders retrieved from, Boundless Psychology / Curation and Revision: Provided by: Boundless.com licensed by CC BY-SA 4.0[32] Image retrieved from Wikipedia public domain CC0

The Development of Attachment

Attachment is a deep and enduring emotional bond that connects one person to another across time and space (Ainsworth, 1973; Bowlby, 1969). Attachment does not have to be reciprocal. One person may have an attachment to an individual which is not shared. Attachment is characterized by specific behaviors in children, such as seeking proximity to the attachment figure when upset or threatened (Bowlby, 1969).

Attachment behavior in adults towards the child includes responding sensitively and appropriately to the child's needs. Such behavior appears universal across cultures. Attachment theory explains how the parent-child relationship emerges and influences subsequent development.

Attachment theory in psychology originates from the seminal work of John Bowlby (1958). In the 1930s John Bowlby worked as a psychiatrist in a Child Guidance Clinic in London, where he treated many emotionally disturbed children. This experience led Bowlby to consider the importance of the child's relationship with their mother in terms of their social, emotional, and cognitive development. Specifically, it shaped his belief about the link between early infant separations from the mother and later maladjustment and led Bowlby to formulate his attachment theory.

John Bowlby, working alongside James Robertson (1952) observed that children experienced intense distress when separated from their mothers. Even when such children were fed by other caregivers, this did not diminish the child's anxiety. These findings contradicted the dominant behavioral theory of attachment (Dollard and Miller, 1950) which was shown to underestimate the child's bond with their mother. The behavioral theory of attachment stated that the child becomes attached to the mother because she fed the infant.

Bowlby defined attachment as a 'lasting psychological connectedness between human beings (1969, *p*. 194). He proposed

that attachment can be understood within an evolutionary context in that the caregiver provides safety and security for the infant. Attachment is adaptive as it enhances the infant's chance of survival. This is illustrated in the work of Lorenz (1935) and Harlow (1958). According to Bowlby infants have a universal need to seek close proximity with their caregiver when under stress or threatened (Prior & Glaser, 2006). Most researchers believe that attachment develops through a series of stages.

Stages of Attachment

Rudolph Schaffer and Peggy Emerson (1964) studied 60 babies at monthly intervals for the first 18 months of life (this is known as a longitudinal study). The children were all studied in their own homes, and a regular pattern was identified in the development of attachment. The babies were visited monthly for approximately one year, their interactions with their carers were observed, and carers were interviewed.

A diary was kept by the mother to examine the evidence for the development of attachment. Three measures were recorded:

- **Stranger Anxiety** – response to the arrival of a stranger.
- **Separation Anxiety** – distress level when separated from a carer, the degree of comfort needed on return.
- **Social Referencing** – the degree a child looks at their carer to check how they should respond to something new (secure base).

They discovered that baby's attachments develop in the following sequence:

Asocial (0 – 6 weeks) – Very young infants are asocial in that many kinds of stimuli, both social and non-social, produce a favorable reaction, such as a smile.

Indiscriminate Attachments (6 weeks to 7 months) **–** Infants indiscriminately enjoy human company, and most babies respond equally to any caregiver. They get upset when an individual ceases to interact with them. From 3 months infants smile more at familiar faces and can be easily comfortable with a regular caregiver.

Specific Attachment (7 – 9 months) **–** Special preference for a single attachment figure emerges. The baby looks to particular people for security, comfort, and protection. It shows fear of strangers (stranger fear) and unhappiness when separated from a special person (separation anxiety). Some babies show stranger fear and separation anxiety much more frequently and intensely than others, nevertheless, they are seen as evidence that the baby has formed an attachment. This has usually developed by one year of age.

Multiple Attachment (10 months and onwards) **–** The baby becomes increasingly independent and forms several attachments. By 18 months, the majority of infants have formed multiple attachments. The results of the study indicated that attachments were most likely to form with those who responded accurately to the baby's signals, not the person they spent more time with. Schaffer and Emerson called this **sensitive responsiveness.** Intensely attached infants had mothers who responded quickly to their demands and, interacted with their children. Infants who were weakly attached had mothers who failed to interact. Many of the babies had several attachments by ten months old, including attachments to mothers, fathers, grandparents, siblings, and neighbors. The mother was the main attachment figure for about half of the children at 18 months old and the father for most of the others. The most important fact in forming attachments is not who feeds and changes the child but who plays and communicates with him or her. Therefore, responsiveness appeared to be the key to attachment.

Attachment Theories

Psychologists have proposed two main theories that are believed to be important in forming attachments. The learning/behaviorist theory of attachment (e.g., Dollard & Miller, 1950) suggests that attachment is a set of learned behaviors. The basis for the learning of attachments is the provision of food. An infant will initially form an attachment to whoever feeds it. They learn to associate the feeder (usually the mother) with the comfort of being fed and through the process of classical conditioning, come to find contact with the mother comforting.

They also find that certain behaviors (e.g., crying, smiling) bring desirable responses from others (e.g., attention, comfort), and through the process of operant conditioning learn to repeat these behaviors to get the things they want.

The evolutionary theory of attachment (e.g., Bowlby, Harlow, Lorenz) suggests that children come into the world biologically pre-programmed to form attachments with others because this will help them to survive. The infant produces innate 'social releaser' behaviors such as crying and smiling that stimulate innate caregiving responses from adults. The determinant of attachment is not food, but care and responsiveness.

Bowlby suggested that a child would initially form only one primary attachment (**monotropy**) and that the attachment figure acted as a secure base for exploring the world. The attachment relationship acts as a prototype for all future social relationships so disrupting it can have severe consequences.

This theory also suggests that there is a critical period for developing an attachment (about 0 -5 years). If an attachment has not developed during this period, then the child will suffer from irreversible developmental consequences, such as reduced intelligence and increased aggression.

Harry Harlow

Harry Harlow (1958) wanted to study the mechanisms by which newborn rhesus monkeys bond with their mothers. These infants were highly dependent on their mothers for nutrition, protection, comfort, and socialization. What, exactly, though, was the basis of the bond?

The behavioral theory of attachment would suggest that an infant would form an attachment with a caregiver that provides food. In contrast, Harlow's explanation was that attachment develops as a result of the mother providing "tactile comfort," suggesting that infants have an innate (biological) need to touch and cling to something for **emotional comfort**. Harry Harlow did a number of studies on attachment in rhesus monkeys during the 1950s and 1960s. His experiments took several forms:

1. **Infant monkeys reared in isolation**– He took babies and isolated them from birth. They had no contact with each other or anybody else. He kept some this way for three months, some for six, some for nine, and some for the first year of their lives. He then put them back with other monkeys to see what effect their failure to form attachment had on behavior. As a result, the monkeys engaged in bizarre behavior such as clutching their own bodies and rocking compulsively. They were then placed back in the company of other monkeys. To start with the babies were scared of the other monkeys, and then became very aggressive towards them. They were also unable to communicate or socialize with other monkeys. The other monkeys bullied them. They indulged in self-mutilation, tearing hair out, scratching, and biting their own arms and legs. Harlow concluded that privation (i.e., never forming an attachment bond) is permanently damaging (to monkeys). The extent of the abnormal behavior reflected the length of the isolation. Those kept in isolation for three months were the

least affected, but those in isolation for a year never recovered the effects of privation.
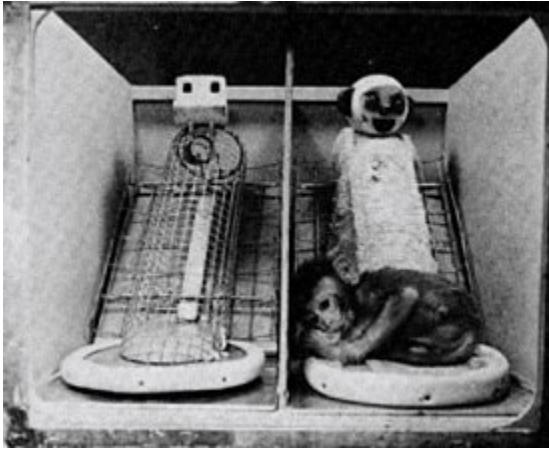
Wire and cloth surrogates. [33]

2. **Infant monkeys reared with surrogate mothers**– 8 monkeys were separated from their mothers immediately after birth and placed in cages with access to two surrogate mothers, one

33. Attachment theory. by McLeod, S. A. retrieved from Simply Psychology licensed under CC NY-NC-ND 3.0[34] Child Growth and Development: An Open Educational Resources Publication by College of the Canyons by Jennifer Paris, Antoinette Ricardo, and Dawn Richmond is licensed under CC BY 4.0

made of wire and one covered in soft terry toweling cloth. Four of the monkeys could get milk from the wire mother and four from the cloth mother. The animals were studied for 165 days. Both groups of monkeys spent more time with the cloth mother (even if she had no milk). The infant would only go to the wire mother when hungry. Once fed it would return to the cloth mother for most of the day. If a frightening object was placed in the cage the infant took refuge with the cloth mother (its safe base). This surrogate was more effective in decreasing the youngster's fear. The infant would explore more when the cloth mother was present. This supports the evolutionary theory of attachment, in that it is the sensitive response and security of the caregiver that is important (as opposed to the provision of food).

The behavioral differences that Harlow observed between the monkeys who had grown up with surrogate mothers and those with normal mothers were;

1. They were much more timid.
2. They didn't know how to act with other monkeys.
3. They were easily bullied and wouldn't stand up for themselves.
4. They had difficulty with mating.
5. The females were inadequate mothers.

These behaviors were observed only in the monkeys who were left with the surrogate mothers for more than 90 days. For those left less than 90 days the effects could be reversed if placed in a normal environment where they could form attachments.

   Harlow concluded that for a monkey to develop normally s/he must have some interaction with an object to which they can cling during the first months of life (critical period). Clinging is a natural response – in times of stress, the monkey runs to the object to which it normally clings as if the clinging decreases the stress. He also concluded that early maternal deprivation leads to emotional

damage but that its impact could be reversed in monkeys if an attachment was made before the end of the critical period. However, if maternal deprivation lasted after the end of the critical period, then no amount of exposure to mothers or peers could alter the emotional damage that had already occurred. Harlow found therefore that it was social deprivation rather than maternal deprivation that the young monkeys were suffering from. When he brought some other infant monkeys up on their own, but with 20 minutes a day in a playroom with three other monkeys, he found they grew up to be quite normal emotionally and socially.

Ethics of Harlow's Study

Harlow's work has been criticized. His experiments have been seen as unnecessarily cruel (unethical) and of limited value in attempting to understand the effects of deprivation on human infants. It was clear that the monkeys in this study suffered from emotional harm from being reared in isolation. This was evident when the monkeys were placed with a normal monkey (reared by a mother), they sat huddled in a corner in a state of persistent fear and depression. Also, Harlow created a state of anxiety in female monkeys which had implications once they became parents. Such monkeys became so neurotic that they smashed their infant's face into the floor and rubbed it back and forth.

Harlow's experiment is sometimes justified as providing a valuable insight into the development of attachment and social behavior. At the time of the research, there was a dominant belief that attachment was related to physical (i.e., food) rather than emotional care. It could be argued that the benefits of the research outweigh the costs (the suffering of the animals). For example, the research influenced the theoretical work of John Bowlby, the most important psychologist in attachment theory. It could also be seen a vital

in convincing people about the importance of emotional care in hospitals, children's homes, and daycare.[34]

Mary Ainsworth and the Strange Situation

Developmental psychologist Mary Ainsworth, a student of John Bowlby, continued studying the development of attachment in infants. Ainsworth and her colleagues created a laboratory test that measured an infant's attachment to his or her parent. The test is called **The Strange Situation** because it is conducted in a context that is unfamiliar to the child and therefore likely to heighten the child's need for his or her parent (Ainsworth, 1979).

During the procedure, which lasts about 20 minutes, the parent and the infant are first left alone, while the infant explores the room full of toys. Then a strange adult enters the room and talks for a minute to the parent, after which the parent leaves the room. The stranger stays with the infant for a few minutes, and then the parent again enters and the stranger leaves the room. During the entire session, a video camera records the child's behaviors, which are later coded by the research team. The investigators were especially interested in how the child responded to the caregiver leaving and returning to the room, referred to as the "reunion." On the basis of their behaviors, the children are categorized into one of four groups where each group reflects a different kind of attachment relationship with the caregiver. One style is secure and the other three styles are referred to as insecure.

34. *Attachment theory.* by McLeod, S. A. retrieved from Simply Psychology licensed under CC NY-NC-ND 3.0[34] Child Growth and Development: An Open Educational Resources Publication by College of the Canyons by Jennifer Paris, Antoinette Ricardo, and Dawn Richmond is licensed under CC BY 4.0

- A child with a **secure attachment** style usually explores freely while the caregiver is present and may engage with the stranger. The child will typically play with the toys and bring one to the caregiver to show and describe from time to time. The child may be upset when the caregiver departs but is also happy to see the caregiver return.
- A child with an **ambivalent (resistant) attachment** style is wary about the situation in general, particularly the stranger, and stays close or even clings to the caregiver rather than exploring the toys. When the caregiver leaves, the child is extremely distressed and is ambivalent when the caregiver returns. The child may rush to the caregiver but then fails to be comforted when picked up. The child may still be angry and even resist attempts to be soothed.
- A child with an **avoidant attachment** style will avoid or ignore the mother, showing little emotion when the mother departs or returns. The child may run away from the mother when she approaches. The child will not explore very much, regardless of who is there, and the stranger will not be treated much differently from the mother.
- A child with a **disorganized (disoriented) attachment** style seems to have an inconsistent way of coping with the stress of the strange situation. The child may cry during the separation, but avoid the mother when she returns, or the child may approach the mother but then freeze or fall to the floor.

How common are the attachment styles among children in the United States? It is estimated that about 65 percent of children in the United States are securely attached. Twenty percent exhibit avoidant styles and 10 to 15 percent are ambivalent. Another 5 to 10 percent may be characterized as disorganized.

Some cultural differences in attachment styles have been found (Rothbaum, Weisz, Pott, Miyake, & Morelli, 2010). For example, German parents value independence and Japanese mothers are typically by their children's sides. As a result, the rate of insecure-

avoidant attachments is higher in Germany and insecure-resistant attachments are higher in Japan. These differences reflect cultural variation rather than true insecurity, however (van Ijzendoorn and Sagi, 1999).

Keep in mind that methods for measuring attachment styles have been based on a model that reflects middle-class, U. S. values and interpretation. Newer methods for assessment of attachment styles involve using a **Q-sort technique** in which a large number of behaviors are recorded on cards and the observer sorts the cards in a way that reflects the type of behavior that occurs within the situation (Waters, 1987). There are 90 items in the third version of the Q-sort technique, and examples of the behaviors assessed include:

- When the child returns to the mother after playing, the child is sometimes fussy for no clear reason.
- When the child is upset or injured, the child will accept comfort from adults other than the mother.
- The child often hugs or cuddles against the mother, without her asking or inviting the child to do so.
- When the child is upset by their mother's leaving, the child continues to cry or even gets angry after she is gone.

At least two researchers observe the child and parent in the home for 1.5-2 hours per visit. Usually, two visits are sufficient to gather adequate information. The parent is asked if the behaviors observed are typical for the child. This information is used to test the validity of the Strange Situation classifications across age, cultures, and clinical populations. .[34]

In the years that have followed Ainsworth's ground-breaking research, researchers have investigated a variety of factors that may help determine whether children develop secure or insecure relationships with their primary attachment figures. As mentioned above, one of the key determinants of attachment patterns is the history of sensitive and responsive interactions between the

caregiver and the child. In short, when the child is uncertain or stressed, the ability of the caregiver to provide support to the child is critical for his or her psychological development. It is assumed that such supportive interactions help the child learn to regulate his or her emotions, give the child the confidence to explore the environment and provide the child with a safe haven during stressful circumstances.

Evidence for the role of sensitive caregiving in shaping attachment patterns comes from longitudinal and experimental studies. For example, Grossmann, Grossmann, Spangler, Suess, and Unzner (1985) studied parent-child interactions in the homes of 54 families, up to three times during the first year of the child's life. At 12 months of age, infants and their mothers participated in the strange situation. Grossmann and her colleagues found that children who were classified as secure in the strange situation at 12 months of age were more likely than children classified as insecure to have mothers who provided responsive care to their children in the home environment.

Van den Boom (1994) developed an intervention that was designed to enhance maternal sensitive responsiveness. When the infants were 9 months of age, the mothers in the intervention group were rated as more responsive and attentive in their interaction with their infants compared to mothers in the control group. In addition, their infants were rated as more sociable, self-soothing, and more likely to explore the environment. At 12 months of age, children in the intervention group were more likely to be classified as secure than insecure in the strange situation.

Attachment Patterns and Child Outcomes

Attachment researchers have studied the association between children's attachment patterns and their adaptation over time. Researchers have learned, for example, that children who are

classified as secure in the strange situation are more likely to have high-functioning relationships with peers, to be evaluated favorably by teachers, and to persist with more diligence in challenging tasks. In contrast, insecure-avoidant children are more likely to be construed as "bullies" or to have a difficult time building and maintaining friendships (Weinfield, Sroufe, Egeland, & Carlson, 2008).[35]

Research on attachment in adolescence finds that teens who are still securely attached to their parents have fewer emotional problems (Rawatlal, Kliewer & Pillay, 2015), are less likely to engage in drug abuse and other criminal behaviors (Meeus, Branje & Overbeek, 2004), and have more positive peer relationships (Shomaker & Furman, 2009).[36]

Attachment Disorder

The Diagnostic and Statistical Manual 5th Edition (DSM-5) classifies **reactive attachment disorder** as a trauma- and stressor-related condition of early childhood caused by social neglect and maltreatment. Affected children have difficulty forming emotional attachments to others, show a decreased ability to experience positive emotion, cannot seek or accept physical or emotional closeness and may react violently when held, cuddled, or comforted. Behaviorally, affected children are unpredictable, difficult to console, and difficult to discipline. Moods fluctuate erratically, and children may seem to live in a "flight, fight, or freeze" mode. Most

35. Attachment Through the Life Course by R. Chris Fraley retrieved from NOBA licensed under CC BY-BC-SA 4.0
36. Lifespan Development: A Psychological Perspective 2nd Edition by Martha Lally and Suzanne Valentine-French is licensed under CC BY-NC-SA 3.0

have a strong desire to control their environment and make their own decisions. Changes in routine, attempts to control, or unsolicited invitations to comfort may elicit rage, violence, or self-injurious behavior. In the classroom, these challenges inhibit the acquisition of core academic skills and lead to rejection from teachers and peers alike.

As they approach adolescence and adulthood, socially neglected children are more likely than their neuro-typical peers to engage in high-risk sexual behavior, substance abuse, have an involvement with the legal system, and experience incarceration

The genesis of reactive attachment disorder is always trauma; specifically, the severe emotional neglect commonly found in institutional settings, such as overcrowded orphanages, foster care, or in homes with mentally or physically ill parents. Over time, infants who do not develop a predictable, nurturing bond with a trusted caregiver, do not receive adequate emotional interaction and mental stimulation halt their attempts to engage others and turn inward, ceasing to seek comfort when hurt, avoiding physical and emotional closeness, and eventually become emotionally bereft. The absence of adequate nurturing results in poor language acquisition, and impaired cognitive development and contributes to behavioral dysfunction.

Since WWII, physicians, psychologists, and attachment theorists have documented the impact of social neglect on physical and emotional development. Experiments completed in the 1940s and 1950s found that maternal deprivation had a profound effect on infant growth, motor development, social interaction, and behavior. In the film *Psychogenic Diseases in Infancy* (Spitz, 1952), infants deviated from the normal, expected course of development and became "unapproachable, weepy and screaming" within the first 2 months of maternal deprivation. As the deprivation continued, facial expressions became rigid and then flat; motor development regressed, and by the fifth month, infants were "lethargic," unable to "sit, stand, walk, or talk," suffered from growth abnormalities, developed "atypical, bizarre finger movements," and no longer

sought or responded to social interaction; 37.3% of the infants died within 2 years. These early experiments became the foundation for Attachment Theory and outlined the constellation of symptoms of what the DSM, *Third Edition* (DSM–III) would later call reactive attachment disorder.

The DSM-5 gives the following criteria for reactive attachment disorder:

- "A consistent pattern of inhibited, emotionally withdrawn behavior toward adult caregivers, manifested by both of the following:
    - The child rarely or minimally seeks comfort when distressed.
    - The child rarely or minimally responds to comfort when distressed.
- A persistent social or emotional disturbance characterized by at least two of the following:
    - Minimal social and emotional responsiveness to others
    - Limited positive affect
    - Episodes of unexplained irritability, sadness, or fearfulness are evident even during nonthreatening interactions with adult caregivers.
- The child has experienced a pattern of extremes of insufficient care as evidenced by at least one of the following:
    - Social neglect or deprivation in the form of persistent lack of having basic emotional needs for comfort, stimulation, and affection met by caring adults
    - Repeated changes of primary caregivers that limit opportunities to form stable attachments (e.g., frequent changes in foster care)
    - Rearing in unusual settings that severely limit opportunities to form selective attachments (e.g., institutions with high child-to-caregiver ratios)
- The care in Criterion C is presumed to be responsible for the

disturbed behavior in Criterion A (e.g., the disturbances in Criterion A began following the lack of adequate care in Criterion

- The criteria are not met for autism spectrum disorder.
- The disturbance is evident before age 5 years.
- The child has a developmental age of at least nine months."

These diagnostic criteria provide an outline of symptoms; however, providers must also recognize the global impact on cognition, behavior, and affective functioning. Abuse in childhood has been correlated with difficulties in working memory and executive functioning, while severe neglect is associated with underdevelopment of the left cerebral hemisphere and the hippocampus. Social skills are below what would be expected of either their chronological age or developmental level. Children with RAD may respond to ordinary interactions with aggression, fear, defiance, or rage. Affected children are more likely to face rejection by adults and peers, develop a negative self-schema, and experience somatic symptoms of distress. Psychomotor restlessness is common, as is hyperactivity and stereotypic movements, such as hand flapping or rocking.RAD increases the risk of anxiety, depression, and hyperactivity, and reduces frustration tolerance. Ailing children are likely to be highly reactive, even in non-threatening situations.

Evaluation

Clinicians should have a low threshold for referring children with a known history of adoption, abuse, foster, or institutional care to a child psychologist or psychiatrist for a comprehensive biopsychosocial assessment detailing the child's history, a description of the symptoms over time, and direct observation of the parent-child interaction. Attachment behaviors and signs of secure attachment (e.g., comfort-seeking, good eye contact, child-

initiated interaction) should be assessed at every visit. Clinicians should maintain a low threshold for referral to a child development specialist, a child psychiatrist, or a child psychologist.

Treatment / Management

Treatment of RAD requires a multi-pronged approach incorporating parent education and trauma-focused therapy. Parent education focused on developing positive, non-punitive behavior management strategies, ways of responding to nonverbal communication, anticipation and coping strategies for when triggers arise and parent-child psychotherapy can facilitate bonding and healthy attachment. Empathy and compassion are key elements to building trust. Developing a nurturing parent-child relationship is the cornerstone to overcoming the damage caused by severe neglect and abuse.

Prognosis

Even with intervention, injured children encounter difficulties in every aspect of their lives; from classroom learning to develop a secure sense of self. The traumatic situations which lead to the attachment disorder create a persistent state of stress that diminishes their capacity for resilience. Early identification and treatment have been shown to improve outcomes; however, parent education and support are key. Parents adopting children from state custody or from overseas orphanages should receive education on the impact of social deprivation and connect them with service agencies or providers specializing in attachment disorders.[37]

37. Reactive Attachment DisorderElizabeth E. Ellis; Musa

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11. Development of the Self and Moral Development

Learning Objectives

After reading Chapter 11, you should be equipped to:

- Describe the development of self-concept and awareness of others.
- Understand the influence of nature and nurture on gender development.
- Describe the various theories of moral development

Development of Self-Concept

How does Self-Concept Emerge?

If you have ever observed an infant between the ages of 6-12 months look at themselves in a mirror you wouldn't be surprised to find

that the infant views his or her reflection as another person. This is because the child has yet to develop a sense of self or self-concept.[1]

Self-concept refers to beliefs about general personal identity (Seiffert, 2011). These beliefs include personal attributes, such as one's age, physical characteristics, behaviors, and competencies. Children in middle and late childhood have a more realistic sense of self than do those in early childhood, and they better understand their strengths and weaknesses. This can be attributed to greater experience in comparing their own performance with that of others, and to greater cognitive flexibility. Children in middle and late childhood are also able to include other peoples' appraisals of them into their self-concept, including parents, teachers, peers, culture, and media.[2]

We aren't born with a self-concept. It develops through interaction with others. Usually, these others are those close to us like parents, siblings, or peers. Let's look at two theories of self based on interaction.

Charles Horton Cooley used the metaphor of a mirror or looking-glass when describing this process. Our self-concept develops when we look at how those around us respond to us, how we look, what we say, and what we do. We then use their reactions to make self-judgments. If those around us respond favorably to us, we'll form a positive sense of self. But if those around us respond with criticism and insult, we interpret that as evidence that we are not good or acceptable. But those around us may respond to us based on more

1. Hamlin, J. K., Wynn, K., & Bloom, P. (2007). Social evaluation by preverbal infants. *Nature*, 450(7169), 557–559. Retrieved from Google Scholar
2. Lifespan Development: A Psychological Perspective 2nd Edition by Martha Lally and Suzanne Valentine-French is licensed under CC BY-NC-SA 3.0[3] Lecture Transcript Module 5 Early Childhood Lifespan Development by Lumen Learning is licensed under CC BY 4.0 (modified by Maria Pagano)

than our own performance or worth. Perhaps they don't notice what we do well or are reluctant to comment on it. As a result, we may have an inaccurate self-concept. And there may be certain periods in life in which we are more self-conscious or concerned with how others view us. Early childhood may be one of those times when children are piecing together a sense of self.

George Herbert Mead also focused on social interaction as important for developing a sense of self. He divided the self into two parts: the "I" or the spontaneous part of the self that is creative and internally motivated, and the "me" or the part of the self that takes into account what other people think. The key to living well is to find ways to give expression to the "I" with the approval of the "me". In other words, find out how to be creative and do what you care about within the guidelines of society. The "I" is inborn. But the "me" develops through social interaction and a process called "taking the role of the other." A child first comes to take the role of a significant other person, typically a parent or sibling. A child, who has been told not to do something, may be found saying "no" to himself. Gradually, the child will come to understand how the generalized other, or society at large, comes to view actions. Now a behavior is not just wrong according to a significant other person, it is wrong as a rule of society. In this way, cultural expectations become part of the judgment of self.

Mirror Recognition Test [3]

As previously discussed, we are not born with a self-concept or sense of self. So, when does one's self-concept begin? Beulah Amsterdam (1972) was the first to study this question with humans. After placing a smudge of rouge surreptitiously on the nose of an infant, Amsterdam asked the child's mother to point to a mirror and ask the child, "Who's that?"

Based on the child's response, Amsterdam found that children could be placed into one of three categories based on their age:

- 6-12 months: The child appeared to believe their refection was another child and, in some cases, tried to play with the "other" child.
- 13-24 months: Some infants in this group were a bit wary of the "other" child and withdrew, while some occasionally smiled.
- 20 months and older: Infants pointed or rubbed the rouge on their nose, leading Amsterdam to believe that this group had achieved self-concept.

The development of language also provides researchers with an insight into the developing self-concept. For example, between the ages of 15 and 18 months children will begin to use words such as "mine" and "my" indicating that they understand their relationship to a person or thing.

Early self-concepts can be quite exaggerated. A child may want to be the biggest or be able to jump the highest or have the longest hair. This exaggerated sense of self is external; the child emphasizes outward expressions and responses in developing a sense of self. Older children tend to become more realistic in their sense of self as they start comparing their own behavior with that of others.[4]

Preschoolers Self Concept

By the age of three or four, children begin to view themselves as separate and unique individuals capable of independent thoughts

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and actions. For example, in striving to become autonomous the 4-year-old may insist on dressing themself. While this may take more patience on the part of parents it is important to allow the child to develop their autonomy. To reinforce taking initiative, caregivers should offer praise for the child's efforts and avoid being critical of messes or mistakes. Soggy washrags and toothpaste left in the sink pales in comparison to the smiling face of a five-year-old that emerges from the bathroom with clean teeth and pajamas![5]

When describing themselves, preschoolers limit their descriptions to concrete expressions such as their physical attributes, age, and sex.

School-Age Children's Self Concept

The period of middle childhood is a time where the child becomes less egocentric and more able to think about themselves in complex ways. According to Erikson, during this time children are very busy or industrious. They are constantly doing, planning, playing, getting together with friends, and achieving. This is a very active time and a time when they are gaining a sense of how they measure up when compared with friends. Erikson believed that if these industrious children can be successful in their endeavors, they will get a sense of confidence for future challenges. If not, a sense of inferiority can be particularly haunting during middle childhood.[6]

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Self-Esteem

Internalizing others' appraisals and creating social comparisons affect children's **self-esteem**, which is defined as an evaluation of one's identity. Children can have individual assessments of how well they perform a variety of activities and also develop an overall global self-assessment. If there is a discrepancy between how children view themselves and what they consider to be their ideal selves, their self-esteem can be negatively affected.[7]

Self-Efficacy

Another important development in self-understanding is **self-efficacy**, which is the belief that you are capable of carrying out a specific task or of reaching a specific goal (Bandura, 1977, 1986, 1997). Large discrepancies between self-efficacy and ability can create motivational problems for the individual (Seifert, 2011). If a student believes that he or she can solve mathematical problems, then the student is more likely to attempt the mathematics homework that the teacher assigns. Unfortunately, the converse is also true. If a student believes that he or she is incapable of math, then the student is less likely to attempt the math homework regardless of the student's actual ability in math. Since self-efficacy is self-constructed, it is possible for students to miscalculate or misperceive their true skills, and these misperceptions can have complex effects on students' motivations. It is possible to have either too much or too little self-efficacy, and according to Bandura

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(1997), the optimum level seems to be either at or slightly above, true ability.[8]

If a person's sense of self-efficacy is very low, he or she can develop learned helplessness, a perception of complete lack of control in mastering a task. The attitude is similar to depression, a pervasive feeling of apathy, and a belief that effort makes no difference and does not lead to success. Learned helplessness was originally studied from the behaviorist perspective of classical and operant conditioning by the psychologist Martin Seligman (1995). In people, learned helplessness leads to characteristic ways of dealing with problems. They tend to attribute the source of a problem to themselves, to generalize the problem to many aspects of life, and to see the problem as lasting or permanent. More optimistic individuals, in contrast, are more likely to attribute a problem to outside sources, to see it as specific to a particular situation or activity, and to see it as temporary or time-limited. Consider, for example, two students who each fail a test. The one with a lot of learned helplessness is more likely to explain the failure by saying something like: "I'm stupid; I never perform well on any schoolwork, and I never will perform well at it." The other, more optimistic student is more likely to say something like: "The teacher made the test too hard this time, so the test doesn't prove anything about how I will do next time or in other subjects."

What is noteworthy about these differences in perception is how much the more optimistic of these perspectives resembles high self-efficacy and how much learned helplessness seems to contradict or differ from it. As already noted, high self-efficacy is a strong belief in one's capacity to carry out a specific task successfully. By definition, therefore, self-efficacy focuses attention

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on a temporary or time-limited activity (the task), even though the cause of successful completion (oneself) is "internal."[9]

Gender Development

Another important dimension of the self is the sense of self as male or female. Preschool-aged children become increasingly interested in finding out the differences between boys and girls both physically and in terms of what activities are acceptable for each. While 2-year-olds can identify some differences and learn whether they are boys or girls, preschoolers become more interested in what it means to be male or female. This self-identification or **gender identity** is followed sometime later with gender constancy or the knowledge that gender does not change. **Gender roles** or the rights and expectations that are associated with being male or female are learned throughout childhood and into adulthood. [10]

Gender roles in play [11]

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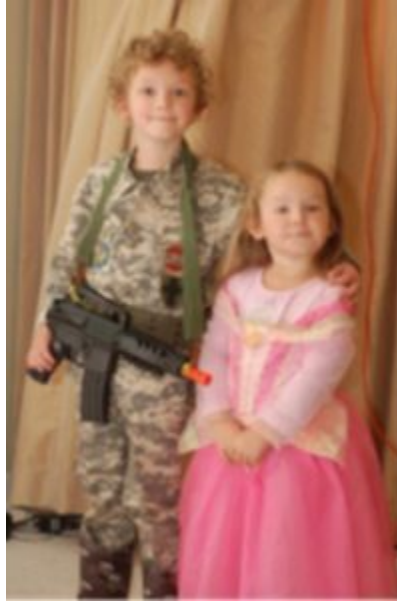
Theories of Gender Development

How do our gender roles and gender stereotypes develop and become so strong? Many of our gender stereotypes are so strong because we emphasize gender so much in culture (Bigler & Liben, 2007). For example, males and females are treated differently before they are even born. When someone learns of a new pregnancy, the first question typically asked is "Is it a boy or a girl?" Immediately upon hearing the answer, judgments are made about the child: Boys will be rough and like blue, while girls will be delicate and like pink.[12]

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The development of gender and gender identity is likewise an interaction among social, biological, and representational influences (Ruble, Martin, & Berenbaum, 2006). Young children learn about gender from parents, peers, and others in society, and develop their own conceptions of the attributes associated with maleness or femaleness (called gender schemas). They also negotiate biological transitions (such as puberty) that cause their sense of themselves and their sexual identity to mature. There are several psychological theories that partially explain how children form their own gender roles after they learn to differentiate based on gender.[13]

Psychoanalytic Theories of Gender Development

Freud believed that masculinity and femininity were learned during the phallic stage of psychosexual development. During the phallic stage, the child develops an attraction to the opposite-sexed parent but after recognizing that that parent is unavailable, learns to model their own behavior after the same-sexed parent. The child develops his or her own sense of masculinity or femininity from this resolution. And, according to Freud, a person who does not exhibit gender-appropriate behavior, such as a woman who competes with men for jobs or a man who lacks self-assurance and dominance, has not successfully completed this stage of development.

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Consequently, such a person continues to struggle with his or her own gender identity.[14]

Chodorow, a neo-Freudian, believed that mothering promotes gender stereotypic behavior. Mothers push their sons away too soon and direct their attention toward problem-solving and independence. As a result, sons grow up confident in their own abilities but uncomfortable with intimacy. Girls are kept dependent too long and are given unnecessary and even unwelcome assistance from their mothers. Girls learn to underestimate their abilities and lack assertiveness but feel comfortable with intimacy.

Both models assume that early childhood experiences result in lifelong gender self-concepts. However, gender socialization is a process that continues throughout life. Children, teens, and adults refine and can modify their sense of self based on gender.[15]

Social Learning Theory

Learning theorists suggest that gender role socialization is a result of the ways in which parents, teachers, friends, schools, religious institutions, media, and others send messages about what is acceptable or desirable behavior as males or females. This socialization begins early-in fact, it may even begin the moment a parent learns that a child is on the way. Knowing the sex of the child can conjure up images of the child's behavior, appearance, and potential on the part of a parent. And this stereotyping continues to guide perception throughout life. Consider parents of newborns,

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shown a 7-pound, 20-inch baby, wrapped in blue (a color designating males) describe the child as tough, strong, and angry when crying. Shown the same infant in pink (a color used in the United States for baby girls), these parents are likely to describe the baby as pretty, delicate, and frustrated when crying. (Maccoby & Jacklin, 1987). Female infants are held more, talked to more frequently, and given direct eye contact, while male infants' play is often mediated through a toy or activity.

Sons are given tasks that take them outside the house and that have to be performed only on occasion while girls are more likely to be given chores inside the home such as cleaning or cooking that is performed daily. Sons are encouraged to think for themselves when they encounter problems and daughters are more likely to be given assistance even when they are working on an answer. This impatience is reflected in teachers waiting less time when asking a female student for an answer than when asking for a reply from a male student (Sadker and Sadker, 1994). Girls are given the message from teachers that they must try harder and endure in order to succeed while boys' successes are attributed to their intelligence. Of course, the stereotypes of advisors can also influence which kinds of courses or vocational choices girls and boys are encouraged to make.

Friends discuss what is acceptable for boys and girls and popularity may be based on modeling what is considered ideal behavior or looks for the sexes. Girls tend to tell one another secrets to validate others as best friends while boys compete for positions by emphasizing their knowledge, strength, or accomplishments. This focus on accomplishments can even give rise to exaggerating accomplishments in boys, but girls are discouraged from showing off and may learn to minimize their accomplishments as a result.

Gender messages abound in our environment. But does this mean that each of us receives and interprets these messages in the same way? Probably not. In addition to being recipients of these

cultural expectations, we are individuals who also modify these roles (Kimmel, 2008).[16]

Cognitive Theory

The Cognitive-Developmental Approach emphasizes the role of cognition (how we think) in the process of gender development. As infants grow older physical changes in the brain mean we progress from simple to complex, abstract thoughts about our gender identity.[17]

Lawrence Kohlberg was the first to look at gender development from a cognitive perspective. He proposed that like cognitive development in the Piagetian sense that developed in stages, so too did children's understanding of gender.

Stage 1. **Gender Identity**:

At approximately ages 2 to 3, the child recognizes that they are a girl or a boy and will also recognize and label others as a girl or a boy. However, that label of "girl" or "boy" is based solely on that other child's outward appearance. Therefore, a child at this stage who sees a child with long hair would label that child as a girl even if it were a boy.

Stage 2. **Gender Stability**:

By 3 years of age, children recognize that their own gender is stable over time. That is a boy will grow into a man and a girl will grow into a woman. However, this same child is still unsure about others. For example, a child in this stage would believe that a girl who plays with trucks would grow up to be a man. So, while the child in this stage understands gender from their own perspective, they do not understand gender from another's perspective.

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Stage 3. **Gender Constancy**:

By the age of 5 or 6 children understand that gender is consistent across all situations, so just because a boy may play with a doll, he will remain a boy.[18]

Although influential, Kohlberg's theory tends to be descriptive rather than explanatory. The theory describes how a child's thinking regarding gender changes as they get older. However, the theory fails to explain why gender schemas change with age. What is affecting the child's schemas/thinking to change over time? [19]

Gender Schema Theory

Gender schema theory argues that children are active learners who essentially socialize themselves. In this case, children actively organize others' behavior, activities, and attributes into gender categories, which are known as schemas. These schemas then affect what children notice and remember later. People of all ages are more likely to remember schema-consistent behaviors and attributes than schema-inconsistent behaviors and attributes. So, people are more likely to remember men, and forget women, who are firefighters. They also misremember schema-inconsistent information. If research participants are shown pictures of someone standing at the stove, they are more likely to remember the person to be cooking if depicted as a woman, and the person to be repairing the stove if depicted as a man. By only remembering schema-consistent information, gender schemas strengthen more and more over time.[20]

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Gender Socialization

Treating boys and girls differently is both a consequence of gender differences and a cause of gender differences and begins with parents. A meta-analysis of research from the United States and Canada found that parents most frequently treated sons and daughters differently by encouraging gender-stereotypical activities (Lytton & Romney, 1991). Fathers, more than mothers, are particularly likely to encourage gender-stereotypical play, especially in sons. Parents also talk to their children differently based on stereotypes. For example, parents talk about numbers and counting twice as often with sons than with daughters (Chang, Sandhofer, & Brown, 2011) and talk to sons in more detail about science than with daughters. Parents are also much more likely to discuss emotions with their daughters than their sons.

Children do a large degree of socializing themselves. By age 3, children play in gender-segregated play groups and expect a high degree of conformity. Children who are perceived as gender-atypical (i.e., do not conform to gender stereotypes) are more likely to be bullied and rejected than their more gender-conforming peers.

In recent years, gender and related concepts have become a common focus of social change and social debate. Many societies, including American society, have seen a rapid change in perceptions of gender roles, media portrayals of gender, and legal trends relating to gender. For example, there has been an increase in children's toys attempting to cater to both genders (such as Legos marketed to girls), rather than catering to traditional stereotypes. Nationwide, the acceptance of homosexuality and gender questioning has resulted in a rapid push for legal change to keep up with social change. [21]

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How Much Does Gender Matter for Children?

Starting at birth, children learn the social meanings of gender from adults and their culture. Gender roles and expectations are especially portrayed in children's toys, books, commercials, video games, movies, television shows, and music (Khorr, 2017). Therefore, when children make choices regarding their gender identification, expression, and behavior that may be contrary to gender stereotypes, it is important that they feel supported by the caring adults in their lives. This support allows children to feel valued, resilient, and develop a secure sense of self (American Academy of Pediatricians, 2015).[22]

Moral Development

Morality is a system of beliefs about what is right and good compared to what is wrong or bad. Moral development is the process whereby children develop an understanding of the proper attitudes and behaviors toward other people in society based on social and cultural norms, rules, and laws.[23] Moral beliefs are related to, but not identical with, moral behavior: it is possible to know the right thing to do, but not actually do it. It is also not the same as knowledge of social conventions, which are arbitrary customs needed for the smooth operation of society. Social conventions may have a moral element, but they have a primarily

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practical purpose. Conventionally, for example, motor vehicles all keep to the same side of the street (to the right in the United States, to the left in Great Britain). The convention allows for the smooth, accident-free flow of traffic. But following the convention also has a moral element, because an individual who chooses to drive on the wrong side of the street can cause injuries or even death. In this sense, choosing the wrong side of the street is wrong morally, though the choice is also unconventional.

When it comes to schooling and teaching, moral choices are not restricted to occasional dramatic incidents but are woven into almost every aspect of classroom life. Imagine this simple example. Suppose that you are teaching, reading to a small group of second graders, and the students are taking turns reading a story out loud. Should you give every student the same amount of time to read, even though some might benefit from having additional time? Or should you give more time to the students who need extra help, even if doing so bores classmates and deprives others of equal shares of "floor time"? Which option is more fair, and which is more considerate? Simple dilemmas like this happen every day at all grade levels simply because students are diverse, and because class time and a teacher's energy are finite.

Embedded in this rather ordinary example are moral themes about fairness or justice, on the one hand, and about consideration or care on the other. It is important to keep both themes in mind when thinking about how students develop beliefs about right or wrong. A morality of justice is about human rights—or more specifically, about respect for fairness, impartiality, equality, and individuals' independence. A morality of care, on the other hand, is about human responsibilities—more specifically, about caring for others, showing consideration for individuals' needs, and interdependence among individuals. Students and teachers need both forms of morality. In the next sections, therefore, we explain

a major example of each type of developmental theory, beginning with the morality of justice.[24]

Piaget's Theory of Moral Development

Piaget based his theory of moral development on the patterns of reasoning used by children of different ages about moral decisions. These moral decisions made by children were based on short stories or "vignettes" told to the children who were then asked questions about who the child believed was naughtier. For example,

1a. A little boy called John is in his room. He is called to dinner. He goes into the dining room. But behind the door, there was a chair, and on the chair, there was a tray with fifteen cups on it. John could not have known that there was all this behind the door. He goes in, the door knocks against the tray, bang go the fifteen cups and they all get broken!

1b. Once there was a little boy whose name was Henry. One day when his mother was out, he tried to get some jam out of the cupboard. He climbed up onto a chair and stretched out his arm. But the jam was too high, and he couldn't reach it and have any. But while he was trying to get it he knocked over a cup. The cup fell down and broke.[25]

The following dialog represents the typical 6-year-old's response and the typical 9-year-old's response to the teacup story:

24. Educational Psychology by Kelvin Seifert and Rosemary Sutton is licensed under CC BY 4.0. However, the link for the text is broken. The text with citation can be found at OER Services
25. Piaget, J. (1965). *The Moral Judgment of the Child.* Glencoe, Illinois. Public domain.

6-year-old Response:

Piaget: Have you understood these stories?

6-year-old: *Yes.*

Piaget: What did the first boy do?

6-year-old: *He broke 11 cups.*

Piaget: And the second one?

6-year-old: *He broke a cup moving roughly.*

Piaget: Why did the first one break the cups?

6-year-old: *Because the door knocked them.*

Piaget: And the second?

6-year-old: *He was clumsy. When he was getting the jam the cup fell down.*

Piaget: Is one of the boys naughtier than the other?

6-year-old: *The first is because he knocked over 12 cups.*

Piaget: If you were the daddy, which one would you punish most?

6-year-old: *The one who broke 12 cups.*

Piaget: Why did he break them?

6-year-old: *The door shut too hard and he knocked them. He didn't do it on purpose.*

Piaget: And why did the other boy break a cup?

6-year-old: *He wanted to get jam. He moved too far. The cup got broken.*[26]

9-year-old Response:

Piaget: Which boy is naughtiest?

9-year-old: Well, the one who broke them as he was coming isn't naughty, 'cos he didn't know there was any cups. The other one wanted to take the jam and caught his arm on a cup.

Piaget: Which one is the naughtiest?

9-year-old: The one who wanted to take the jam.

Piaget: How many cups did he break?

9-year-old: One.

Piaget: And the other boy?

9-year-old: Fifteen.

Piaget: Which one would you punish most?

9-year-old The boy who wanted to take the jam. He did it on purpose.[27]

Up until the age of about 2, Piaget (1965) believed that infants and children were premoral and had no conscious awareness of rules

26. Piaget, J. (1965). The Moral Judgment of the Child. Glencoe, Illinois. Public domain.
27. Piaget, J. (1965). *The Moral Judgment of the Child.* Glencoe, Illinois. Public domain.

or morality. However, based on his interviews with older children Piaget consistently found that children younger than 7 tend to view the child who broke more cups as being naughtier than the child who broke fewer cups. However, by 8 years of age, the child begins to understand that one's intentions are an important factor when judging morality.

Piaget (1965) suggested two main types of moral thinking:

- **Heteronomous morality** (moral realism) (4 to 7 years)
- **Autonomous morality** (moral relativism) (Begins by age 7 or 8)

Heteronomous Morality

Younger children, according to Piaget reasoned about morality in a way that was heteronomous, or subject to the control of others such as parents, teachers, and even God. In addition, these authority figures have the ability to impose punishment based on their power over the child. This type of thinking is also egocentric, in that the younger child cannot see the situation from different points of view, therefore intent is meaningless in the younger child's determination of who is naughtier.

Another aspect of heteronomous thinking is immanent justice or the idea that automatic punishments come to someone based on their prior bad behavior or deed. For example in one moral dilemma posed to children, Piaget notes how children in this stage believe that a boy who stole apples then ran away only to fall through a rotting bridge into the water, fell through the bridge because he stole the apples. In other words, his fall was causally related to his bad deed and was a punishment for what he had done. [28]

28. Piaget, J. (1965). *The Moral Judgment of the Child*. Glencoe, Illinois. Public domain.

Autonomous Morality

This second stage sees the child move away from being egocentric and consequently begins to understand the broader perspective of another as well as their intentions. The child also understands that rules are arbitrary constructs that are created by mutual consent for reasons of fairness and that following these rules is beneficial to them when interacting with others.[29]

Kohlberg's Theory of Moral Development

One of the best-known explanations of how the morality of justice develops was developed by Lawrence Kohlberg and his associates (Kohlberg, Levine, & Hewer, 1983; Power, Higgins, & Kohlberg, 1991). To explore this area, he read the following moral dilemma to boys of different age groups:

   A woman was on her deathbed. There was one drug that 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 laboratory 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?

29. *The Moral Judgment of the Child*

What is important in terms of the answer is not whether you replied, "Yes, I would steal the drug," or "No, I would not steal the drug," but rather your rationale for the answer.

Based on participants' responses Kohlberg developed a three-level (preconventional, conventional, and postconventional), six-stage (two stages for each level) theory of moral development whereby individuals experience the stages universally and in sequence as they form beliefs about justice. [30]

Kohlberg's Stages of Moral Development

Preconventional Level

At the **preconventional level**, a child's sense of morality is externally controlled. A child accepts that a rule is a rule simply because someone in authority says so. Any behavior that results in a punishment is deemed as bad, whereas any behavior that results in a reward is deemed as good.

Stage 1: Punishment and Obedience – In this stage, children find it hard to distinguish between two separate moral points of view, especially in a moral dilemma. The focus continues to be on behaving according to adult rules and avoiding punishment.

Stage 2: **Instrumental Purpose** – In this stage, children start to understand people can have conflicting moral views in the same situation; however, they view the "right" choice as the choice that has the most benefit for themselves rather than others.

Conventional Level

At the **conventional level**, children still believe they should follow rules, but not only for themselves. Rather, rules should be followed

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to maintain social order and keep positive relationships among others.

Stage 3: Interpersonal Cooperation – In this stage, children want to obey rules because "that's what a good person should do. " They focus on maintaining positive relationships with others, and they believe a good person should be trustworthy, loyal, and respectful. The main idea in this stage is following the Golden Rule – "Do unto others as you would have them do unto you. "

Stage 4: **Social-order maintenance** – In this stage, a child begins to look at the bigger picture of the world and how rules impact it. Rules should be enforced in the same way for all people; equality plays a large role in morality. Children believe all people play a role in upholding and maintaining social order.

Postconventional or Principled Level

At the **postconventional** or principled level, children can think of morals and values in an abstract way and begin to realize some moral dilemmas do not have a clear-cut, right or wrong answer.

Stage 5: **Social contract** – In this stage, children start to see the flexibility of rules and can imagine alternative situations. The social contract orientation believes that a person follows (or breaks) a rule because it brings about more good than harm in the long run.

Stage 6: **Universal ethical principle** – In this stage, a child believes the right action is the one chosen by his or her conscience and what is in the best interest of a person, regardless of the legality. Children begin to consider how a law (or breaking a law) would impact a person's life, values, and self-worth.[31]

Summary and Examples of Responses for Each Stage[32]

31. Children's Development by Ana R. Leon is licensed under CC BY 4.0
32. Lifespan Development: A Psychological Perspective 2nd Edition by Martha Lally and Suzanne Valentine-French is licensed under CC BY-NC-SA 3.0 (modified by Maria Pagano)

Age	Moral Level	Description
Young children prior to Age 9	Preconventional Morality	Stage 1: Focus is on self-interest and punishment is avoided. The man shouldn't steal the drug, as he may get caught and go to jail. Stage 2: Rewards are sought. A person at this level will argue that the man should steal the drug because he does not want to lose his wife who takes care of him.
Older children, adolescents, and most adults	Conventional morality	Stage 3: Focus is on how situational outcomes impact others and wanting to please and be accepted. The man should steal the drug because that is what good husbands do. Stage 4: People make decisions based on laws or formalized rules. Man should obey the law because stealing is a crime.
Rare in adolescents and few adults	Postconventional morality	Stage 5: Individuals employ abstract reasoning to justify behaviors and make it clear that while they do not generally favor breaking the law, laws are social contracts that we agree to until we can change them by democratic means. The man should steal the drug because laws can be unjust, and you have to consider the whole situation. Moral rights must be protected. Stage 6: Moral behavior is based on self-chosen ethical principles that should look to settle disputes through the principles of justice that require each of us to impartially consider and respect the rights of all who are involved. Finding an answer to this question is not easy, and for this reason, Kohlberg actually dropped this stage from his scoring.

Although research has supported Kohlberg's idea that moral reasoning changes from an early emphasis on punishment and social rules and regulations to an emphasis on more general ethical principles, as with Piaget's approach, Kohlberg's stage model is

probably too simple. For one, people may use higher levels of reasoning for some types of problems but revert to lower levels in situations where doing so is more consistent with their goals or beliefs (Rest, 1979). Second, it has been argued that the stage model is particularly appropriate for Western, rather than non-Western, samples in which allegiance to social norms, such as respect for authority, may be particularly important (Haidt, 2001). In addition, there is frequently little correlation between how we score on the moral stages and how we behave in real life.

Perhaps the most important critique of Kohlberg's theory is that it may describe the moral development of males better than it describes that of females (Jaffee & Hyde, 2000). One of Kohlberg's students, Carol Gilligan (1982) has argued that, because of differences in their socialization, males tend to value principles of justice and rights, whereas females value caring for and helping others. Although there is little evidence for a gender difference in Kohlberg's stages of moral development (Turiel, 1998), it is true that girls and women tend to focus more on issues of caring, helping, and connecting with others than do boys and men (Jaffee & Hyde, 2000).[33]

33. Lifespan Development: A Psychological Perspective 2nd Edition by Martha Lally and Suzanne Valentine-French is licensed under CC BY-NC-SA 3.0 (modified by Maria Pagano)

Carol Gilligan and the Morality of Care

Carol and James Gilligan [34]

As logical as they sound, Kohlberg's stages of moral justice are not sufficient for understanding the development of moral beliefs. To see why this is, suppose that you have a student who asks for an extension of the deadline for an assignment. The justice orientation

34. Image was retrieved from wikiwand.com and is licensed under CC BY-SA 4.0

of Kohlberg's theory would prompt you to consider issues of whether granting the request is fair. Would the late student be able to put more effort into the assignment than other students? Would the extension place a difficult demand on you since you would have less time to mark the assignments? These are important considerations related to the rights of students and the teacher. In addition to these, however, are considerations having to do with the responsibilities that you and the requesting student have for each other and for others. Does the student have a valid personal reason (illness, death in the family, etc.) for the assignment being late? Will the assignment lose its educational value if the student has to turn it in prematurely? These latter questions have less to do with fairness and rights, and more to do with taking care of and responsibility for students. They require a framework different from Kohlberg's to be understood fully.

One such framework has been developed by Carol Gilligan, whose ideas center on the morality of care, or a system of beliefs about human responsibilities, care, and consideration for others. Gilligan proposed three moral positions that represent different extents or breadth of ethical care. Unlike Kohlberg, Piaget, or Erikson, she does not claim that the positions form a strictly developmental sequence, but only that they can be ranked hierarchically according to their depth or subtlety. In this respect, her theory is "semi-developmental" in a way similar to Maslow's theory of motivation (Brown & Gilligan, 1992; Taylor, Gilligan, & Sullivan, 1995). The table below summarizes the three moral positions from Gilligan's theory:

Positions of Moral Development According to Gilligan

Moral Position	Definition of What is Morally Good
Position 1: Survival orientation	Action that considers one's personal needs only
Position 2: Conventional care	Action that considers others' needs or preferences, but not one's own
Position 3: Integrated care	Action that attempts to coordinate one's own personal needs with those of others.

Position 1: Survival Orientation

The most basic kind of caring is a **survival orientation**, in which a person is concerned primarily with his or her own welfare. If a teenage girl with this ethical position is wondering whether to get an abortion, for example, she will be concerned entirely with the effects of the abortion on herself. The morally good choice will be whatever creates the least stress for herself and that disrupts her own life the least. Responsibilities to others (the baby, the father, or her family) play little or no part in her thinking.

As a moral position, a survival orientation is obviously not satisfactory for classrooms on a widespread scale. If every student only looked out for himself or herself, classroom life might become rather unpleasant! Nonetheless, there are situations in which focusing primarily on yourself is both a sign of good mental health and relevant to teachers. For a child who has been bullied at school or sexually abused at home, for example, it is both healthy and morally desirable to speak out about how bullying or abuse has affected the victim. Doing so means essentially looking out for the victim's own needs at the expense of others' needs, including the bully's or abuser's. Speaking out, in this case, requires a survival orientation and is healthy because the child is taking care of themself.

Position 2: Conventional Caring

A more subtle moral position is **conventional caring** (caring for others)**,** in which a person is concerned about others' happiness and welfare, and about reconciling or integrating others' needs where they conflict with each other. In considering an abortion, for example, the teenager at this position would think primarily about what other people prefer. Do the father, her parents, and/or her doctor want her to keep the child? The morally good choice becomes whatever will please others the best. This position is more demanding than Position 1, ethically and intellectually, because it requires coordinating several persons' needs and values. But it is

often morally insufficient because it ignores one crucial person: the self.

In classrooms, students who operate from Position 2 can be very desirable in some ways; they can be eager to please, considerate, and good at fitting in and at working cooperatively with others. Because these qualities are usually welcome in a busy classroom, teachers can be tempted to reward students for developing and using them. The problem with rewarding Position 2 ethics, however, is that doing so neglects the student's development—his or her own academic and personal goals or values. Sooner or later, personal goals, values, and identity need attention and care, and educators have a responsibility for assisting students to discover and clarify them.

Position 3: Integrated Caring

The most developed form of moral caring in Gilligan's model is **integrated caring**, the coordination of personal needs and values with those of others. Now the morally good choice takes account of everyone including yourself, not everyone except yourself. In considering an abortion, a woman at Position 3 would think not only about the consequences for the father, the unborn child, and her family but also about the consequences for herself. How would bearing a child affect her own needs, values, and plans? This perspective leads to moral beliefs that are more comprehensive but ironically are also more prone to dilemmas because the widest possible range of individuals are being considered.

In classrooms, integrated caring is most likely to surface whenever teachers give students wide, sustained freedom to make choices. If students have little flexibility about their actions, there is little room for considering anyone's needs or values, whether their own or others. If the teacher says simply: "Do the homework on page 50 and turn it in tomorrow morning," then the main issue becomes compliance, not a moral choice. But suppose instead that she says something like this: "Over the next two months, figure out an inquiry project about the use of water resources in our town. Organize it any way you want—talk to people, read widely about

it, and share it with the class in a way that all of us, including yourself, will find meaningful." An assignment like this poses moral challenges that are not only educational but also moral since it requires students to make value judgments. Why? For one thing, students must decide what aspect of the topic really matters to them. Such a decision is partly a matter of personal values. For another thing, students have to consider how to make the topic meaningful or important to others in the class. Third, because the timeline for completion is relatively far in the future, students may have to weigh personal priorities (like spending time with friends or family) against educational priorities (working on the assignment a bit more on the weekend). As you might suspect, some students might have trouble making good choices when given this sort of freedom—and their teachers might therefore be cautious about giving such an assignment. But the difficulties in making choices are part of Gilligan's point: integrated caring is indeed more demanding than caring based only on survival or on consideration of others. Not all students may be ready for it.[35]

Social Domain Theory

Like the theories of Piaget, Kohlberg, and Gilligan, **Social domain theory** adopts the premise that children actively construct ways of understanding their world. However, unlike these theories moral development is viewed in terms of the individual's interactions with their environment, and that moral reasoning is a separate domain of social knowledge. According to Turiel (1983) there are three domains of knowledge, the moral (how individuals should treat one

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35. Educational Psychology by Kelvin Seifert and Rosemary Sutton is licensed under CC BY 4.0 . However, the link for the text is broken. The text with citation can be found at OER Services

another), the societal (conventions designed to foster the functioning of social groups which can vary from culture to culture), and the personal (matters of individual choice that do not affect others). Each of these domains is independent and develops in early childhood. Consequently, children as young as four years of age can evaluate and assess not only their own moral behavior but the behavior of others.[36]

In the tradition of Piaget and Kohlberg social domain researchers also ask children probing questions regarding the moral transgressions of others after having been presented with stories that reflect a moral indiscretion. However, unlike Piaget and Kohlberg, follow questions such as, "Would it still be wrong to do "X" behavior even if there was no rule about it?" are asked. Research from such studies has consistently revealed that children as young as 4 understand the difference between situations that are moral in nature (i.e. taking something that is not yours is always wrong) versus situations that are social in nature (i.e. It's not polite to cut in front of the line), versus situation that are personal in nature (i.e. I don't like loud discussion, but if someone else does then that's their choice).[37]

36. Turiel, E. (1983). *The development of social knowledge: Morality and convention (Cambridge studies in social and emotional development)*. New York City, New York: Cambridge University Press.
37. Lourenco, O. (2014). Domain theory: A critical review. New Ideas in Psychology, 32, 1-17. Retrieved from https://www.researchgate.net/publication/ 259130460_Domain_theory_A_critical_review

Moral Development in the Family

In the formation of children's morals, no outside influence is greater than that of the family. Through punishment, reinforcement, and both direct and indirect teaching, families instill morals in children and help them to develop beliefs that reflect the values of their culture. Although families' contributions to children's moral development are broad, there are particular ways in which morals are most effectively conveyed and learned.

Justice

Families establish rules for right and wrong behavior, which are maintained through positive reinforcement and punishment. Positive reinforcement is the reward for good behavior and helps children learn that certain actions are encouraged above others. Punishment, by contrast, helps to deter children from engaging in bad behaviors, and from an early age helps children to understand that actions have consequences. This system additionally helps children to make decisions about how to act, as they begin to consider the outcomes of their own behavior.

Fairness

The notion of what is fair is one of the central moral lessons that children learn in the family context. Families set boundaries on the distribution of resources, such as food and living spaces, and allow members different privileges based on age, gender, and employment. The way in which a family determines what is fair affects children's development of ideas about rights and entitlements, and also influences their notions of sharing, reciprocity, and respect.

Personal Balance

Through understanding principles of fairness, justice, and social responsibilities, children learn to find a balance between their own needs and wants and the interests of the greater social environment. By placing limits on their own individual desires, children benefit from a greater sense of love, security, and shared

identity. At the same time, this connectedness helps children to refine their own moral system by providing them with a reference for understanding right and wrong.

Social Roles

In the family environment, children come to consider their actions not only in terms of justice but also in terms of emotional needs. Children learn the value of social support from their families and develop motivations based on kindness, generosity, and empathy, rather than on only personal needs and desires. By learning to care for the interests and well-being of their family, children develop concern for society.[38]

Are We Born Moral? Helpers and Hinderers

Hamlin, Wynn, and Bloom (2007) tested 10-month-old infants by first habituating them to a scene where a red circle or "climber" repeatedly attempts to climb a hill but is not successful. On the third attempt, the "climber" was either assisted by a yellow triangle, a "helper" who pushed the "climber" from behind or was pushed down by a blue, "hinderer" square. During the test phase, infants were given the opportunity to reach for or touch either the yellow triangle "helper," or blue square "hinderer." Fourteen of the 16 10-month-olds chose the yellow triangle "helper" leading Hamlin, Wynn, and Bloom (2007) to conclude that the infants were basing their decisions on a social preference for the "helper." They further went on to contend that this preference for those who perform positive social acts over those who performed negative social acts formed the basis for the development of later moral cognition.[39]

38. Child and Adolescent Psychology Lumen Learning licensed under CC BY 4.0 (modified by Maria Pagano)
39. Hamlin, J. K., Wynn, K., & Bloom, P. (2007). Social evaluation by
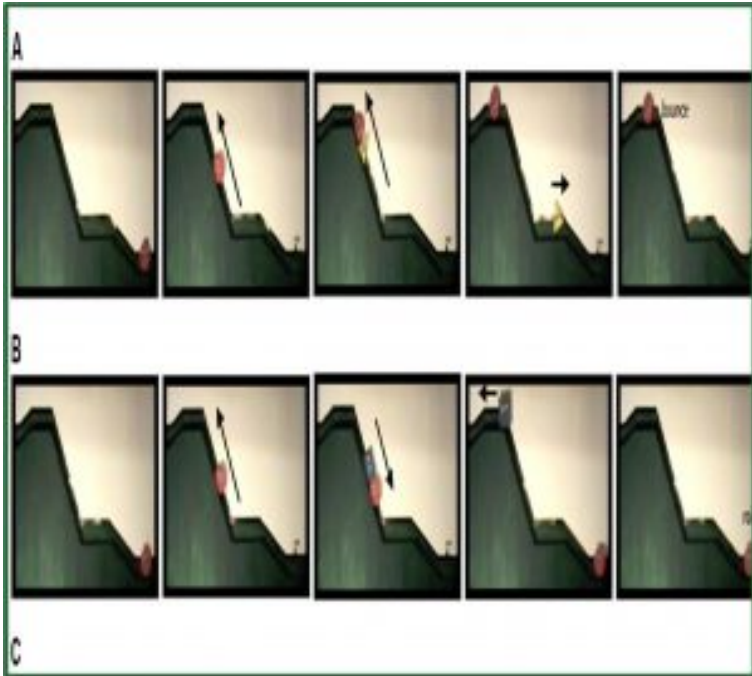
Ten-month-old infants were first habituated to a scene where a red circle or "climber" repeatedly attempts to climb a hill but is not successful. On the third attempt, the "climber" was either assisted by a

preverbal infants. *Nature*, 450(7169), 557–559. Retrieved from Google Scholar

yellow triangle, a "helper" who pushed the "climber" from behind or was pushed down by a blue, "hinderer" square.[40]

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40. Image retrieved from Hamlin, J.K. (2015) Front. Psychol., 29 January 2015 | https://doi.org/10.3389/fpsyg.2014.01563 is licensed under Creative Commons Attribution License (CC BY 4.0). (modified by Marie Parnes)

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12. Social Cognition and Peer Relationships

Theory of Mind

What is Theory of Mind?

One of the most fascinating human capacities is the ability to perceive and interpret other people's behavior in terms of their mental states. Having an appreciation for the workings of another person's mind is considered a prerequisite for natural language acquisition (Baldwin & Tomasello, 1998), strategic social interaction

(Zhang, Hedden, & Chia, 2012), reflexive thought (Bogdan, 2000), and moral judgment (Guglielmo, Monroe, & Malle, 2009). This capacity develops from early beginnings in the first year of life to the adult's fast and often effortless understanding of others' thoughts, feelings, and intentions. And though we must speculate about its evolutionary origin, we do have indications that the capacity evolved sometime in the last few million years.[1]

Theory of mind refers to the ability to think about other people's thoughts. This mental mind reading helps humans to understand and predict the reactions of others, thus playing a crucial role in social development. One common method for determining if a child has reached this mental milestone is the **false-belief task**. The research began with a clever experiment by Wimmer and Perner (1983), who tested whether children could pass a false-belief test (see the chart below). The child is shown a picture story of Sally, who puts her ball in a basket and leaves the room. While Sally is out of the room, Anne comes along and takes the ball from the basket and puts it inside a box. The child is then asked where Sally thinks the ball is located when she comes back to the room. Is she going to look first in the box or in the basket? The right answer is that she will look in the basket because that is where she put it and thinks it is, but we have to infer this false belief against our own better knowledge that the ball is in the box. This is very difficult for children before the age of four because of the cognitive effort it takes. Three-year-olds have difficulty distinguishing between what they once thought was true and what they now know to be true. They feel confident that what they know now is what they have always known (Birch & Bloom, 2003). Even adults need to think through this task (Epley, Morewedge, & Keysar, 2004). To be successful at solving this type

1. Malle, B. (2020). Theory of mind. In R. Biswas-Diener & E. Diener (Eds), *Noba textbook series: Psychology*. Champaign, IL: DEF publishers. Retrieved from http://noba.to/a8wpytg3 is licensed under CC BY NC SA 4.0

of task the child must separate what he or she "knows" to be true from what someone else might "think" is true. The child must also understand that what guides people's actions and responses are what they believe rather than what is reality. In other words, people can mistakenly believe things that are false and will act based on this false knowledge. Consequently, prior to age four children are rarely successful at solving such a task (Wellman, Cross & Watson, 2001).[2]
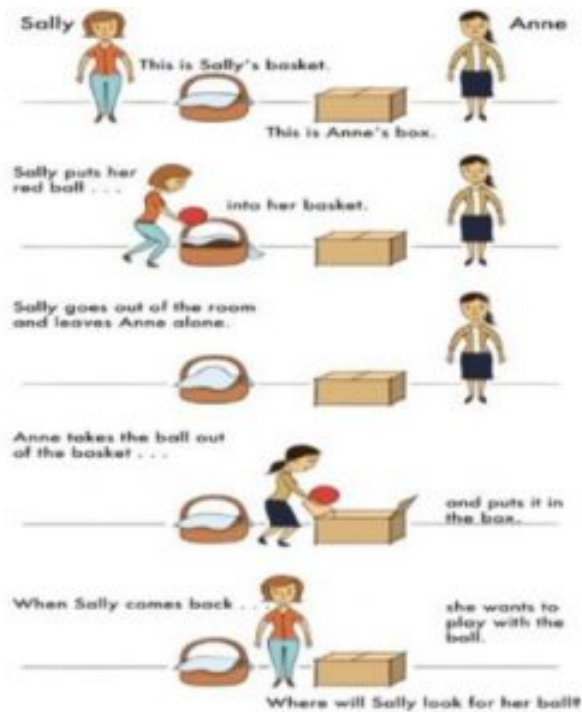
Sally   Anne

This is Sally's basket.

This is Anne's box.

Sally puts her red ball . . .   into her basket.

Sally goes out of the room and leaves Anne alone.

Anne takes the ball out of the basket . . .   and puts it in the box.

When Sally comes back . . .   she wants to play with the ball.

Where will Sally look for her ball?

2. Lifespan Development: A Psychological Perspective 2nd Edition by Martha Lally and Suzanne Valentine-French is licensed under CC BY-NC-SA 3.0

The Sally-Anne task [3]

Researchers examining the development of theory of mind have been concerned by the overemphasis on the mastery of false belief as the primary measure of whether a child has attained theory of mind. Two-year-olds understand the diversity of desires, yet as noted earlier it is not until age four or five that children grasp false belief, and often not until middle childhood do, they understand that people may hide how they really feel. In part, because children in early childhood have difficulty hiding how they really feel. Wellman and his colleagues (Wellman, Fang, Liu, Zhu & Liu, 2006) suggest that theory of mind is comprised of a number of components, each with its own developmental timeline (see the table below). [4]

Component	Description
Diverse-desires	Understanding that two people may have different desires regarding the same object.
Diverse-beliefs	Understanding that two people may hold different beliefs about an object.
Knowledge access (knowledge/ignorance)	Understanding that people may or may not have access to information.
False belief	Understanding that someone might hold a belief based on false information.

3. ThMalle, B. (2020). Theory of mind. In R. Biswas-Diener & E. Diener (Eds), Noba textbook series: Psychology. Champaign, IL: DEF publishers. Retrieved from http://noba.to/a8wpytg3 is licensed under CC BY NC SA 4.0
4. Lifespan Development: A Psychological Perspective 2nd Edition by Martha Lally and Suzanne Valentine-French is licensed under CC BY-NC-SA 3.0

Those in early childhood in the US, Australia, and Germany develop theory of mind in the sequence outlined in Table 4.2. Yet, Chinese and Iranian preschoolers acquire knowledge access before diverse beliefs (Shahaeian, Peterson, Slaughter & Wellman, 2011). Shahaeian and colleagues suggested that cultural differences in child-rearing may account for this reversal. Parents in collectivistic cultures, such as China and Iran, emphasize conformity to the family and cultural values, greater respect for elders, and the acquisition of knowledge and academic skills more than they do autonomy and social skills (Frank, Plunkett & Otten, 2010). This could reduce the degree of familial conflict of opinions expressed in the family. In contrast, individualistic cultures encourage children to think for themselves and assert their own opinion, and this could increase the risk of conflict in beliefs being expressed by family members. As a result, children in individualistic cultures would acquire insight into the question of diversity of belief earlier, while children in collectivistic cultures would acquire knowledge access earlier in the sequence. The role of conflict in aiding the development of theory of mind may account for the earlier age of onset of an understanding of false belief in children with siblings, especially older siblings (McAlister & Petersen, 2007; Perner, Ruffman & Leekman, 1994). [5]

5. Lifespan Development: A Psychological Perspective 2nd Edition by Martha Lally and Suzanne Valentine-French is licensed under CC BY-NC-SA 3.0

The Role of Theory of Mind in Social Life

Children form an alliance to complete the puzzle. [6]

Put yourself in this scene: You observe two people's movements, one behind a large wooden object, the other reaching behind him and then holding a thin object in front of the other. Without a

6. . Image retrieved from pixabay.com is licensed under CC0.

theory of mind, you would neither understand what this movement stream meant nor be able to predict either person's likely responses. With the capacity to interpret certain physical movements in terms of mental states, perceivers can parse this complex scene into intentional actions of reaching and giving (Baird & Baldwin, 2001); they can interpret the actions as instances of offering and trading; and with an appropriate cultural script, they know that all that was going on was a customer pulling out her credit card with the intention to pay the cashier behind the register. People's theory of mind thus frames and interprets perceptions of human behavior in a particular way—as perceptions of agents who can act intentionally and who have desires, beliefs, and other mental states that guide their actions (Perner, 1991; Wellman, 1990).

Not only would social perceivers without a theory of mind be utterly lost in a simple payment interaction; without a theory of mind, there would probably be no such things as cashiers, credit cards, and payment (Tomasello, 2003). Plain and simple, humans need to understand minds in order to engage in the kinds of complex interactions that social communities (small and large) require. And it is these complex social interactions that have given rise, in human cultural evolution, to houses, cities, and nations; to books, money, and computers; to education, law, and science.

- The list of social interactions that rely deeply on theory of mind is long; here are a few highlights.
- Teaching another person new actions or rules by taking into account what the learner knows or doesn't know and how one might best make him understand.
- Learning the words of a language by monitoring what other people attend to and are trying to do when they use certain words.
- Figuring out our social standing by trying to guess what others think and feel about us.
- Sharing experiences by telling a friend how much we liked a movie or by showing her something beautiful.

- Collaborating on a task by signaling to one another that we share a goal and understand and trust the other's intention to pursue this joint goal.[7]

The Mental Processes Underlying Theory of Mind

The first thing to note is that "theory of mind" is not a single thing. What underlies people's capacity to recognize and understand mental states is a whole host of components—a toolbox, as it were, for many different but related tasks in the social world (Malle, 2008). The figure below shows some of the most important tools, organized in a way that reflects the complexity of involved processes: from simple and automatic on the bottom to complex and deliberate on the top. This organization also reflects development—from tools that infants master within the first 6–12 months to tools they need to acquire over the next 3–5 years. Strikingly, the organization also reflects evolution: monkeys have available the tools on the bottom; chimpanzees have available the tools at the second level, but only humans master the remaining tools above. Let's look at a few of them in more detail.

7. Malle, B. (2020). Theory of mind. In R. Biswas-Diener & E. Diener (Eds), *Noba textbook series: Psychology*. Champaign, IL: DEF publishers. Retrieved from http://noba.to/a8wpytg3 is licensed under CC BY NC SA 4.0

Some of the major tools of the theory of mind, with the bottom showing simple, automatic, early developing, and evolutionarily old processes, and the top showing complex, more deliberate, late-developing, and evolutionarily recent processes.

Agents, Goals, and Intentionality

The agent category allows humans to identify those moving objects in the world that can act on their own. Features that even very young children take to be indicators of being an agent include being self-propelled, having eyes, and reacting systematically to the interaction partner's behavior, such as following gaze or imitating (Johnson, 2000; Premack, 1990).

The process of recognizing **goals** builds on this agent category because agents are characteristically directed toward goal objects, which means they seek out, track, and often physically contact said objects. Even before the end of their first year, infants recognize that humans reach toward an object they strive for even if that object changes location or if the path to the object contains obstacles (Gergely, Nádasdy, Csibra, & Bíró, 1995; Woodward, 1998). What it means to recognize goals, therefore, is to see the systematic and predictable relationship between a particular agent pursuing a particular object across various circumstances.

Through learning to recognize the many ways by which agents pursue goals, humans learn to pick out behaviors that are intentional. The concept of **intentionality** is more sophisticated than the goal concept. For one thing, human perceivers recognize that some behaviors can be unintentional even if they were goal-directed—such as when you unintentionally make a fool of yourself even though you had the earnest goal of impressing your date. To act intentionally you need, aside from a goal, the right kinds of beliefs about how to achieve the goal. Moreover, the adult concept of intentionality requires that an agent have the skill to perform the intentional action in question: If I am flipping a coin, trying to make it land on heads, and if I get it to land on heads on my first try, you would not judge my action of making it land on heads as intentional—you would say it was luck (Malle & Knobe, 1997).

Imitation, Synchrony, and Empathy

Imitation and empathy are two other basic capacities that aid the understanding of mind from childhood on (Meltzoff & Decety, 2003). **Imitation** is the human tendency to carefully observe others' behaviors and do as they do—even if it is the first time the perceiver has seen this behavior. A subtle, automatic form of imitation is called mimicry, and when people mutually mimic one another they can reach a state of **synchrony**. Have you ever noticed when two people in conversation take on similar gestures, body positions, and even tone of voice? They "synchronize" their behaviors by way of (largely) unconscious imitation. Such synchrony can happen even at very low levels, such as negative physiological arousal (Levenson & Ruef, 1992), though the famous claim of synchrony in women's menstrual cycles is a myth (Yang & Schank, 2006). Interestingly, people who enjoy an interaction synchronize their behaviors more, and increased synchrony (even manipulated in an experiment) makes people enjoy their interaction more (Chartrand & Bargh, 1999). Some research findings suggest that synchronizing is made possible by brain mechanisms that tightly link perceptual information with motor information (when I see you move your arm, my arm-moving program is activated). In monkeys, highly specialized so-called mirror neurons fire both when the monkey sees a certain action and when it performs that same action (Rizzolatti, Fogassi, & Gallese, 2001). In humans, however, things are a bit more complex. In many everyday settings, people perceive uncountable behaviors and fortunately don't copy all of them (just consider walking in a crowd—hundreds of your mirror neurons would fire in a blaze of confusion). Human imitation and mirroring are selective, triggering primarily actions that are relevant to the perceiver's current state or aim.

Automatic empathy builds on imitation and synchrony in a clever way. If Bill is sad and expresses this emotion in his face and body, and if Elena watches or interacts with Bill, then she will subtly imitate his dejected behavior and, through well-practiced

associations of certain behaviors and emotions, she will feel a little sad as well (Sonnby-Borgström, Jönsson, & Svensson, 2003). Thus, she empathizes with him—whether she wants to or not. Try it yourself. Type "sad human faces" into your Internet search engine and select images from your results. Look at 20 photos and pay careful attention to what happens to your face and to your mood. Do you feel almost a "pull" of some of your facial muscles? Do you feel a tinge of melancholy?

Joint Attention, Visual Perspective Taking

Going beyond the automatic, humans are capable of actively engaging with other people's mental states, such as when they enter into situations of **joint attention**—like Marissa and Noah, who are each looking at an object and are both aware that each of them is looking at the object. This sounds more complicated than it really is. Just point to an object when a 3-year-old is around and notice how both the child and you check in with each other, ensuring that you are really jointly engaging with the object. Such shared engagement is critical for children to learn the meaning of objects—both their value (is it safe and rewarding to approach?) and the words that refer to them (what do you call this?). When I hold up my keyboard and show it to you, we are jointly attending to it, and if I then say it's called "Tastatur" in German, you know that I am referring to the keyboard and not to the table on which it had been resting.

Another important capacity of engagement is **visual perspective taking**: You are sitting at a dinner table and advise another person on where the salt is—do you consider that it is to her left even though it is to your right? When we overcome our egocentric perspective this way, we imaginatively adopt the other person's spatial viewpoint and determine how the world looks from their perspective. In fact, there is evidence that we mentally "rotate" toward the other's spatial location, because the farther away the

person sits (e.g., 60, 90, or 120 degrees away from you) the longer it takes to adopt the person's perspective (Michelon & Zacks, 2006).

Projection, Simulation (and the Specter of Egocentrism)

When imagining what it might be like to be in another person's psychological position, humans have to go beyond mental rotation. One tool to understand the other's thoughts or feelings is a **simulation**—using one's own mental states as a model for others' mental states: "What would it feel like sitting across from the stern interrogator? I would feel scared . . ." An even simpler form of such modeling is the assumption that the other thinks, feels, and wants what we do—which has been called the "like-me" assumption (Meltzoff, 2007) or the inclination toward social **projection** (Krueger, 2007). In a sense, this is an absence of perspective-taking, because we assume that the other's perspective equals our own. This can be an effective strategy if we share with the other person the same environment, background, knowledge, and goals, but it gets us into trouble when this presumed common ground is in reality lacking. Let's say you know that Brianna doesn't like Fred's new curtains, but you hear her exclaim to Fred, "These are beautiful!" Now you have to predict whether Fred can figure out that Brianna was being sarcastic. It turns out that you will have a hard time suppressing your own knowledge in this case and you may overestimate how easy it is for Fred to spot the sarcasm (Keysar, 1994). Similarly, you will overestimate how visible that pimple is on your chin—even though it feels big and ugly to you, in reality very few people will ever notice it (Gilovich & Savitsky, 1999). So the next time when you spot a magnificent bird high up in the tree and you get impatient with your friend who just can't see what is clearly obvious, remember: it's obvious to you.

What all these examples show is that people use their own current state—of knowledge, concern, or perception—to grasp other people's mental states. And though they often do so correctly,

they also get things wrong at times. This is why couples counselors, political advisors, and Buddhists agree on at least one thing: we all need to try harder to recognize our egocentrism and actively take other people's perspectives—that is, grasp their actual mental states, even if (or especially when) they are different from our own.[8]

Explicit Mental State Inference

The ability to truly take another person's perspective requires that we separate what we want, feel, and know from what the other person is likely to want, feel, and know. To do so humans make use of a variety of information. For one thing, they rely on stored knowledge—both general knowledge ("Everybody would be nervous when threatened by a man with a gun") and agent-specific knowledge ("Joe was fearless because he was trained in martial arts"). For another, they critically rely on perceived facts of the concrete situation—such as what is happening to the agent, the agent's facial expressions and behaviors, and what the person saw or didn't see.

This capacity of integrating multiple lines of information into a mental-state inference develops steadily within the first few years of life, and this process has led to a substantial body of research that began with the Sally-Anne, False Belief Task previously discussed.[9]

8. Malle, B. (2020). Theory of mind. In R. Biswas-Diener & E. Diener (Eds), *Noba textbook series: Psychology*. Champaign, IL: DEF publishers. Retrieved from http://noba.to/a8wpytg3 is licensed under CC BY NC SA 4.0

9. Malle, B. (2020). Theory of mind. In R. Biswas-Diener & E. Diener (Eds), *Noba textbook series: Psychology*. Champaign, IL: DEF publishers. Retrieved from http://noba.to/a8wpytg3 is licensed under CC BY NC SA 4.0 (modified by Maria Pagano)

Can Infants Understand Intentional Actions?

As we have seen, children's experience of relationships at home and the peer group contributes to an expanding repertoire of social and emotional skills and to broadened social understanding. In these relationships, children develop expectations for specific people (leading, for example, to secure or insecure attachments to parents), understanding of how to interact with adults and peers, and develop self-concept based on how others respond to them. These relationships are also significant forums for emotional development.

Remarkably, young children begin developing social understanding very early in life. Before the end of the first year, infants are aware that other people have perceptions, feelings, and other mental states that affect their behavior, and which are different from the child's own mental states. This can be readily observed in social referencing, where the infant looks to the mother's face when confronted with an unfamiliar person or situation (Feinman, 1992). If the mother looks calm and reassuring, the infant responds positively as if the situation is safe. If the mother looks fearful or distressed, the infant is likely to respond with wariness or distress because the mother's expression signals danger. In a remarkably insightful manner, therefore, infants show an awareness that even though they are uncertain about the unfamiliar situation, their mother is not and that by "reading" the emotion in her face, infants can learn about whether the circumstance is safe or dangerous, and how to respond.

Although developmental scientists used to believe that infants did not possess a theory of mind, they now realize that the opposite is true. Infants are aware at an early stage that people have different mental states, and this motivates them to try to figure out what others are feeling, intending, wanting, and thinking, and how these mental states affect their behavior. They are beginning, in other words, to develop a theory of mind, and although their understanding of mental states begins very simply, it rapidly

expands (Wellman, 2011). For example, if an 18-month-old watches an adult try repeatedly to drop a necklace into a cup but inexplicably fail each time, they will immediately put the necklace into the cup themselves—thus completing what the adult intended, but failed, to do. In doing so, they reveal their awareness of the intentions underlying the adult's behavior (Meltzoff, 1995). Carefully designed experimental studies show that by late in the preschool years, young children understand that another's beliefs can be mistaken rather than correct, that memories can affect how you feel, and that one's emotions can be hidden from others (Wellman, 2011). Social understanding grows significantly as children's theory of mind develops.

How do these achievements in social understanding occur? One answer is that young children are remarkably sensitive observers of other people, making connections between their emotional expressions, words, and behavior to derive simple inferences about mental states (e.g., concluding, for example, that what Mommy is looking at is in her mind) (Gopnik, Meltzoff, & Kuhl, 2001). This is especially likely to occur in relationships with people whom the child knows well, consistent with the ideas of attachment theory discussed above. Growing language skills give young children words with which to represent these mental states (e.g., "mad," "wants") and talk about them with others. Thus, in conversation with their parents about everyday experiences, children learn much about people's mental states from how adults talk about them ("Your sister was sad because she thought Daddy was coming home.") (Thompson, 2006b). Developing social understanding is, in other words, based on children's everyday interactions with others and their careful interpretations of what they see and hear. There are also some scientists who believe that infants are biologically prepared to perceive people in a special way, as organisms with an internal mental life, and this facilitates their interpretation of

people's behavior with reference to those mental states (Leslie, 1994).[10]

Autism and Theory of Mind

Another way of appreciating the enormous impact that theory of mind has on social interactions is to study what happens when the capacity is severely limited, as in the case of autism (Tager-Flusberg, 2007). In a fascinating discussion in which (high-functioning) autistic individuals talk about their difficulties with other people's minds (Blackburn, Gottschewski, George, & L—, 2000), one person reports: "I know people's faces down to the acne scars on the left corners of their chins . . . and how the hairs of their eyebrows curl. . . . The best I can do is start picking up bits of data during my encounter with them because there's not much else I can do. . . . I'm not sure what kind of information about them I'm attempting to process." What seems to be missing, as another person with autism remarks, is an "automatic processing of 'people information.'" Some autistic people report that they perceive others "in a more analytical way." This analytical mode of processing, however, is very tiresome and slow: "Given time I may be able to analyze someone in various ways, and seem to get good results, but may not pick up on certain aspects of an interaction until I am obsessing over it hours or days later" (Blackburn et al., 2000).[11]

10. Noba Project is licensed under CC BY NC SA 4.0 (modified by Maria Pagano)[11] Lifespan Development: A Psychological Perspective 2nd Edition by Martha Lally and Suzanne Valentine-French is licensed under CC BY-NC-SA 3.0

Play

What is Play?

"Play is behavior that looks as if it has no purpose," says NIH psychologist Dr. Stephen Suomi. "It looks like fun, but it actually prepares for a complex social world." Evidence suggests that **play** can help boost brain function, increase fitness, improve coordination and teach cooperation. Suomi notes that all mammals—from mice to humans—engage in some sort of play. His research focuses on rhesus monkeys. While he's cautious about drawing parallels between monkeys and people, his studies offer some general insights into the benefits of play.

All mammals engage in some sort of play. [11]

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11. Images retrieved from Pixabay.com are licensed under CC0.

Active, vigorous social play during development helps to sculpt the monkey brain. The brain grows larger. Connections between brain areas may strengthen. Play also helps monkey youngsters learn how to fit into their social group, which may range from 30 to 200 monkeys in 3 or 4 extended families. Both monkeys and humans live in highly complex social structures, says Suomi. "Through play, rhesus monkeys learn to negotiate, to deal with strangers, to lose gracefully, to stop before things get out of hand, and to follow rules," he says. These lessons prepare monkey youngsters for life after they leave their mothers.

Play may have similar effects in the human brain. Play can help lay a foundation for learning the skills we need for social interactions. If human youngsters lack playtime, says Dr. Roberta Golinkoff, an infant language expert at the University of Delaware, "social skills will likely suffer. You will lack the ability to inhibit impulses, to switch tasks easily and to play on your own." Play helps young children master their emotions and make their own decisions. It also teaches flexibility, motivation, and confidence.

Kids don't need expensive toys to get a lot out of playtime. "Parents are children's most enriching plaything," says Golinkoff. Playing and talking to babies and children are vital for their language development. Golinkoff says that kids who talk with their parents tend to acquire a vocabulary that will later help them in school. "In those with parents who make a lot of demands, language is less well developed," she says. The key is not to take over the conversation, or you'll shut it down.[12]

12. Child and Adolescent Psychology Lumen Learning licensed under CC BY 4.0

Why is Play Important?

Play is a spontaneous, voluntary, pleasurable, and flexible activity involving a combination of body, object, symbol use, and relationships. In contrast to games, play behavior is more disorganized, and is typically done for its own sake (i.e., the process is more important than any goals or endpoints). Recognized as a universal phenomenon, play is a legitimate right of childhood and should be part of all children's life. Between 3% to 20% of young children's time and energy is spent in play, and more so in a non-impoverished environment. Although play is an important arena in children's life associated with immediate, short-term, and long-term term benefits, cultural factors influence children's opportunities for free play in different ways. Over the last decade, there has been an ongoing reduction of playtime in favor of educational instructions, especially in modern and urban societies. Furthermore, parental concerns about safety sometimes limit children's opportunities to engage in playful and creative activities. Along the same lines, the increase in commercial toys and technological developments by the toy industry has fostered more sedentary and less healthy play behaviors in children. Yet, play is essential to young children's education and should not be abruptly minimized and segregated from learning. Not only does play help children develop pre-literacy skills, problem-solving skills, and concentration, but it also generates social learning experiences, and helps children to express possible stresses and problems.

Throughout the preschool years, young children engage in different forms of play, including social, parallel, object, sociodramatic, and locomotor play. The frequency and type of play vary according to children's age, cognitive maturity, physical development, as well as the cultural context. For example, children with physical, intellectual, and/or language disabilities engage in play behaviors, yet they may experience delays in some forms of

play and require more parental supervision than typically developing children.

Social play is usually the first form of play observed in young children. Social play is characterized by playful interactions with parents (up to age 2) and/or other children (from two years onwards). In spite of being around other children of their age, children between 2 to 3 years old commonly play next to each other without much interaction (i.e., parallel play). As their cognitive skills develop, including their ability to imagine, imitate, and understand others' beliefs and intents, children start to engage in sociodramatic play. While interacting with same-age peers, children develop narrative thinking, problem-solving skills (e.g., when negotiating roles), and a general understanding of the building blocks of the story. Around the same time, physical/locomotor play also increases in frequency. Although locomotor play typically includes running and climbing, play fighting is common, especially among boys aged three to six. In contrast to popular belief, play fighting lacks intent to harm either emotionally or physically even though it can look like real fighting. In fact, during the primary school years, only about 1% of play-fighting turn into serious physical aggression. Nevertheless, the effects of such play are of special concern among children who display antisocial behavior and less empathic understanding, and therefore supervision is warranted.

In addition, to vary according to the child's factors, the frequency, type, and play area are influenced by the cultural context. While there are universal features of play across cultures (e.g., traditional games and activities and gender-based play preferences), differences also exist. For instance, children who live in rural areas typically engage in more free play and have access to larger spaces for playing. In contrast, adult supervision in children's play is more frequent in urban areas due to safety concerns. Along the same lines, cultures value and react differently to play. Some adults refrain from engaging in play as it represents a spontaneous activity for children while others promote the importance of structuring

play to foster children's cognitive, social and emotional development.

According to proponents of play pedagogy, there are specific skills and knowledge children should be supported in developing, and therefore play needs to be goal directed to some extent. *Playworlds* is an example of educational practice in which children and adults interpret a text from children's literature through visual and plastic arts, pretend play, and oral narration. These highly engaging activities foster children's literacy skills and their interests in books and reading, without imposing adult authority and hierarchy.

If play is associated with children's academic and social development, teachers, parents, and therapists are encouraged to develop knowledge about the different techniques to help children develop their play-related skills. However, in order to come up with best practices, further research on the examination of high-quality play is warranted.

From the available literature on play, it is recommended to create play environments to stimulate and foster children's learning. Depending on the type of play, researchers suggest providing toys that enhance children's:

- motor coordination (e.g., challenging forms of climbing structure);
- creativity (e.g., building blocks, paint, clay, play dough);
- mathematic skills (e.g., board games "Chutes and Ladders" – estimation, counting, and numeral identification);
- language and reading skills (e.g., plastic letters, rhyming games, making shopping lists, bedtime story books, toys for pretending).

Other recommendations have been suggested in order to enhance literacy skills in children. Researchers suggest that setting up literacy-rich environments, such as a "real restaurant" with tables, menus, name tags, pencils, and notepads, are effective to increase children's potential in early literacy development. Educators are

also encouraged to adopt a whole child approach that targets not only literacy learning but also the child's creativity, imagination, persistence, and positive attitudes in reading. Teachers and educators should also make a parallel between what can be learned from playful activities and the academic curriculum in order for children to understand that play allows them to practice and reinforce what is learned in class. However, educators should ensure that a curriculum based on playful learning includes activities that are perceived as playful by children themselves rather than only by the teachers. Most experts agree that a balanced approach consisting of periods of free play and structured/guided play should be favored. Indeed, adults are encouraged to give children space during playtime to enable the development of self-expression and independence in children with and without disabilities. Lastly, parents of children with socio-emotional difficulties are encouraged to receive play therapy training (filial play therapy) to develop empathic understanding and responsive involvement during playtime.[13]

Infants and Play

As previously discussed, the development of the relationship between infants and their primary caregivers during the first year of life provides the foundation for security, guidance, and knowledge. Infants who go on to develop secure attachments with their caregivers typically form significant relationships with peers.[14]

13. Play: Synthesis. In: Tremblay RE, Boivin M, Peters RDeV, eds. Smith PK, topic ed. *Encyclopedia on Early Childhood Development* [online]. http://www.child-encyclopedia.com/play/synthesis. Updated June 2013. Accessed July 29, 2020. Used with permission.
14. Maria Pagano

Social interaction with another child who is similar in age, skills, and knowledge provokes the development of many social skills that are valuable for the rest of life (Bukowski, Buhrmester, & Underwood, 2011). In peer relationships, children learn how to initiate and maintain social interactions with other children. They learn skills for managing conflict, such as turn-taking, compromise, and bargaining. Play also involves the mutual, sometimes complex, coordination of goals, actions, and understanding. For example, as infants, children get their first encounter with sharing (of each other's toys); during pretend play as preschoolers they create narratives together, choose roles, and collaborate to act out their stories; and in primary school, they may join a sports team, learning to work together and support each other emotionally and strategically toward a common goal. Through these experiences, children develop friendships that provide additional sources of security and support to those provided by their parents.[15]

But can infants form meaningful peer relationships? According to Hay, Kaplen and Nash (2009), "By the end of the first year, infants begin to communicate, share, and participate in conflict with peers and to forge early friendships." Most infants not only notice and respond to the cries of another infant but will show interest in another infant by reaching out to touch them. [16] By their first birthday infants will seek out others for play and might be seen joining a peer in filling a bucket with sand or blocks. By the age of two children begin to engage in pretend play and can solve simple sorting tasks like placing blocks in one bucket and balls in another. By the age of two, toddlers are also aware of what is "Mine" and this

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15. Text with citation can be found at OER Services and is licensed by
16. Hay, D. F., Caplan, M., & Nash, A. (2009). *The beginnings of peer relations.* In K. H. Rubin, W. M. Bukowski, & B. Laursen (Eds.), S*ocial, emotional, and personality development in context. Handbook of peer interactions, relationships, and groups* (p. 121–142). The Guilford Press.

can result in peer conflicts. However, the understanding of what is mine, also indicates that the toddler has begun to develop a sense of self. Finally, around the age of 3, children begin to move from play predominantly with their parents to play with peers.[17]

Theories of Play

Freud saw play as a means for children to release pent-up emotions and to deal with emotionally distressing situations in a more secure environment. Vygotsky and Piaget saw play as a way for children to develop their intellectual abilities (Dyer & Moneta, 2006). Piaget created stages of play that correspond with his stages of cognitive development. The stages are:

Piaget's Stages of Play

Stage	Description
Functional Play	Exploring, inspecting, and learning through repetitive physical activity.
Symbolic Play	The ability to use objects, actions, or ideas to represent other objects, actions, or ideas and may include taking on roles.[11]
Constructive Play	Involves experimenting with objects to build things[12]; learning things that were previously unknown with hands on manipulations of materials.
Games with Rules	Imposes rules that must be followed by everyone that is playing; the logic and order involved forms that the foundations for developing game playing strategy[13]

17. Maria Pagano

> While Freud, Piaget, and Vygotsky looked at play slightly differently, all three theorists saw play as providing positive outcomes for children [18]

Parten's Theory of Play

Parten (1932) observed two to five-year-old children and noted six types of play: Three labeled as non-social play (unoccupied, solitary, and onlooker) and three categorized as social play (parallel, associative, and cooperative). The table below describes each type of play. Younger children engage in non-social play more than those older; by age five associative and cooperative play are the most common forms of play (Dyer & Moneta, 2006).[19]

Parten's Classification of Types of Play in Preschool Children

18. Child Growth and Development: An Open Educational Resources Publication by College of the Canyons by Jennifer Paris, Antoinette Ricardo, and Dawn Richmond is licensed under CC BY 4.0[19] Child Growth and Development: An Open Educational Resources Publication by College of the Canyons by Jennifer Paris, Antoinette Ricardo, and Dawn Richmond is licensed under CC BY 4.0

CATEGORY	DESCRIPTION
Unoccupied Play	Children's behavior seems more random and without a specific goa
Solitary Play	Children play by themselves, do not interact with others, nor are th children around them.
Onlooker Play	Children are observing other children playing. They may comment but will not directly join the play.
Parallel Play	Children play alongside each other, using similar toys, but do not di
Associative Play	Children will interact with each other and share toys but are not wo
Cooperative Play	Children are interacting to achieve a common goal. Children may ta

Peer Relationships

Peer Relationships and their Influences on Social and Emotional Skills

Social interaction with another child who is similar in age, skills, and knowledge provokes the development of many social skills that are valuable for the rest of life (Bukowski, Buhrmester, & Underwood, 2011). In **peer relationships**, children learn how to initiate and maintain social interactions with other children. They learn skills for managing conflict, such as turn-taking, compromise, and bargaining. Play also involves the mutual, sometimes complex, coordination of goals, actions, and understanding. For example, as preschoolers engage in pretend play, they create narratives together, choose roles, and collaborate to act out their stories. Through these experiences, children develop friendships that

provide additional sources of security and support to those provided by their parents.[19]

Peer relationships are particularly important for children. Being accepted by other children is an important source of affirmation and self-esteem, but peer rejection can foreshadow later behavior problems (especially when children are rejected due to aggressive behavior).

With increasing age, children confront the challenges of bullying, peer victimization, and managing conformity pressures. Social comparison with peers is an important means by which children evaluate their skills, knowledge, and personal qualities, but it may cause them to feel that they do not measure up well against others. For example, a boy who is not athletic may feel unworthy of his football-playing peers and revert to shy behavior, isolating himself and avoiding conversation. Conversely, an athlete who doesn't "get" Shakespeare may feel embarrassed and avoid reading altogether. Also, with the approach of adolescence, peer relationships become focused on psychological intimacy, involving personal disclosure, vulnerability, and loyalty (or its betrayal)—which significantly influences a child's outlook on the world. Each of these aspects of peer relationships require developing very different social and emotional skills than those that emerge in parent-child relationships. They also illustrate the many ways that peer relationships influence the growth of personality and self-concept.[20]

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20. Child and Adolescent Psychology Lumen Learning licensed under CC BY 4.0 (modified by Marie Parnes)

Imaginary Companions

An intriguing occurrence in early childhood is the emergence of imaginary companions. Researchers differ in how they define what qualifies as an **imaginary companion**. Some studies include only invisible characters that the child refers to in conversation or plays with for an extended period of time. Other researchers also include objects that the child personifies, such as a stuffed toy or doll, or characters the child impersonates every day. Estimates of the number of children who have imaginary companions varies greatly (from as little as 6% to as high as 65%) depending on what is included in the definition (Gleason, Sebanc, & Hartup, 2000). Little is known about why children create imaginary companions, and more than half of all companions have no obvious trigger in the child's life (Masih, 1978). Imaginary companions are sometimes based on real people, characters from stories, or simply names the child has heard (Gleason, et. al., 2000). Imaginary companions often change over time. In their study, Gleason et al. (2000) found that 40% of the imaginary companions of the children they studied changed, such as developing superpowers, switching age, gender, or even dying, and 68% of the characteristics of the companion were acquired over time. This could reflect greater complexity in the child's "creation" over time and/or a greater willingness to talk about their imaginary playmates. In addition, research suggests that contrary to the assumption that children with imaginary companions are compensating for poor social skills, several studies have found that these children are very sociable (Mauro, 1991; Singer & Singer, 1990; Gleason, 2002). However, studies have reported that children with imaginary companions are more likely to be first-borns or only-children (Masih, 1978; Gleason et al., 2000, Gleason, 2002). Although not all research has found a link between birth order and the incidence of imaginary playmates (Manosevitz, Prentice, & Wilson, 1973). Moreover, some studies have found little or no difference in the presence of imaginary companions and

parental divorce (Gleason et al., 2000), number of people in the home, or the amount of time children are spending with real playmates (Masih, 1978; Gleason & Hohmann, 2006). Do children treat real friends differently? The answer appears to be not really. Young children view their relationship with their imaginary companion to be as supportive and nurturing as with their real friends. Gleason has suggested that this might suggest that children form a schema of what is a friend and use this same schema in their interactions with both types of friends (Gleason, et al., 2000; Gleason, 2002; Gleason & Hohmann, 2006).[21]

Some studies define imaginary companions as invisible characters that the child refers to in conversation or plays with for an extended period of time.[22]

21. Lifespan Development: A Psychological Perspective 2nd Edition by Martha Lally and Suzanne Valentine-French is licensed under CC BY-NC-SA 3.0[23] Lifespan Development: A Psychological Perspective 2nd Edition by Martha Lally and Suzanne Valentine-French is licensed under CC BY-NC-SA 3.0
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Sociometric Peer Status and Popularity

Sociometric assessment measures attraction between members of a group, such as a classroom of students. In sociometric research children are asked to mention the three children they like to play with the most, and those they do not like to play with. The number of times a child is nominated for each of the two categories (like, do not like) is tabulated. Popular children receive many votes in the "like" category, and very few in the "do not like" category. In contrast, rejected children receive more unfavorable votes, and few favorable ones. Controversial children are mentioned frequently in each category, with several children liking them and several children placing them in the do not like category. Neglected children are rarely mentioned in either category while the average child has a few positive votes with very few negative ones (Asher & Hymel, 1981).

Most children want to be liked and accepted by their friends. Some popular children are nice and have good social skills. These

popular-prosocial children tend to do well in school and are cooperative and friendly. Popular-antisocial children may gain popularity by acting tough or spreading rumors about others (Cillessen & Mayeux, 2004). Rejected children are sometimes excluded because they are rejected-withdrawn. These children are shy and withdrawn and are easy targets for bullies because they are unlikely to retaliate when belittled (Boulton, 1999). Other rejected children are rejected-aggressive and are ostracized because they are aggressive, loud, and confrontational. The aggressive-rejected children may be acting out of a feeling of insecurity. Unfortunately, their fear of rejection only leads to behavior that brings further rejection from other children. Children who are not accepted are more likely to experience conflict, lack confidence, and have trouble adjusting (Klima & Repetti, 2008; Schwartz, Lansford, Dodge, Pettit, & Bates, 2014).[23]

Sociometric Peer Status[23]

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CATEGORY	DESCRIPTION
Popular Children	Receive many votes in the "like" category, and very few in the "do not like" category.
Rejected Children	Receive more unfavorable votes and a few favorable ones.
Controversial Children	Mentioned frequently in each category, with several children liking them and several children placing them in the do not like category.
Neglected Children	Rarely mentioned in either category.
Average Children	Have a few positive votes with very few negative votes.
Popular- Prosocial Children	Are nice and have good social skills; tend to do well in school and are cooperative and friendly.
Popular-Antisocial Children	May gain popularity by acting tough or spreading rumors about others.
Rejected -Withdrawn Children	Are shy and withdrawn and are easy targets for bullies because they are unlikely to retaliate when belittled.
Rejected-Aggressive Children	Are ostracized because they are aggressive, loud, and confrontational. They may be acting out of a feeling of insecurity.

Long-Term Outcomes of Popularity

Childhood popularity researcher Mitch Prinstein has found that likability in childhood leads to positive outcomes throughout one's life (as cited in Reid, 2017). Adults who were accepted in childhood have stronger marriages and work relationships, earn more money, and have better health outcomes than those who were unpopular. Furthermore, those who were unpopular as children, experienced greater anxiety, depression, substance use, obesity, physical health problems, and suicide. Prinstein found that a significant consequence of unpopularity was that children were denied opportunities to build their social skills and negotiate complex interactions, thus contributing to their continued unpopularity. Further, biological effects can occur due to unpopularity, as social

rejection can activate genes that lead to an inflammatory response.[24]

Bullying

According to Stopbullying.gov (2018), a federal government website managed by the U.S. Department of Health & Human Services, **bullying** is defined as unwanted, aggressive behavior among school-aged children that involves a real or perceived power imbalance. Further, the aggressive behavior happens more than once or has the potential to be repeated.

To be considered bullying, the behavior must be aggressive and include:

- **An Imbalance of Powe**r: Kids who bully use their power—such as physical strength, access to embarrassing information, or popularity—to control or harm others. Power imbalances can change over time and in different situations, even if they involve the same people.
- **Repetition**: Bullying behaviors happen more than once or have the potential to happen more than once.

Bullying includes actions, such as making threats, spreading rumors, attacking someone physically or verbally, and excluding someone from a group on purpose.[25]

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Type of bullying

Bullied at school	Total: 20.2, Male: 16.7, Female: 23.8
Subject of rumors	Total: 13.4, Male: 9.3, Female: 17.5
Made fun of, called names, or insulted	Total: 13.0, Male: 10.3, Female: 15.8
Pushed, shoved, tripped, or spit on	Total: 5.3, Male: 6.1, Female: 4.4
Excluded from activities on purpose	Total: 5.2, Male: 3.5, Female: 6.9
Threatened with harm	Total: 3.9, Male: 4.2, Female: 3.6
Tried to make do things did not want to do	Total: 1.9, Male: 1.9, Female: 1.9
Property destroyed on purpose	Total: 1.4, Male: 1.3, Female: 1.5

Percent: 0.0, 20.0, 40.0, 60.0, 80.0, 100.0

Legend: ■ Total, ■ Male, ▨ Female

Percentage of students ages 12-18 who reported being bullied at school during the school year, by type of bullying and sex (NOTE: "At school" includes in the school building, on school property, on a school bus, and going to and from school. Students who reported experiencing more than one type of bullying at school

were counted only once in the total for students bullied at school.) [26]

Types of Bullying

Verbal bullying: saying or writing mean things. Verbal bullying includes:

- Teasing
- Name-calling
- Inappropriate sexual comments
- Taunting
- Threatening to cause harm

Social bullying: sometimes referred to as relational bullying, involves hurting someone's reputation or relationships. Social bullying includes:

- Leaving someone out on purpose
- Telling other children not to be friends with someone
- Spreading rumors about someone
- Embarrassing someone in public

26. U.S. Department of Justice, Bureau of Justice Statistics, School Crime Supplement (SCS) to the National Crime Victimization Survey, 2017 National Center for Education Statistics NCES. Public Domain

Physical bullying: hurting a person's body or possessions. Physical bullying includes:

- Hitting, kicking, or pinching
- Spitting
- Tripping or pushing
- Taking or breaking someone's things
- Making mean or rude hand gestures

There are three types of bullying: verbal, social, and physical. [27]

The Roles Kids Play in Bullying

The roles kids play in bullying are not limited to those who bully

27. Image retrieved from Pixabay is licensed under CC0.

others and those who are bullied. Some researchers talk about the "circle of bullying" to define both those directly involved in bullying and those who actively or passively assist the behavior or defend against it. Direct roles include:

- **Kids who Bully:** These children engage in bullying behavior towards their peers. There are many risk factors that may contribute to the child's involvement in the behavior. Often, these students require support to change their behavior and address any other challenges that may be influencing their behavior.
- **Kids who are Bullied:** These children are the targets of bullying behavior. Some factors put children at more risk of being bullied, but not all children with these characteristics will be bullied. Sometimes, these children need help learning how to respond to bullying.

Even if a child is not directly involved in bullying, they may be contributing to the behavior. Witnessing the behavior may also affect the child, so it is important for them to learn what they should do when they see bullying happen. Roles kids play when they witness bullying include:

- **Kids who Assist**: These children may not start the bullying or lead in the bullying behavior but serve as "assistants" to children who are bullying. These children may encourage bullying behavior and occasionally join in.
- **Kids who Reinforce**: These children are not directly involved in the bullying behavior, but they give the bullying an audience. They will often laugh or provide support for the children who are engaging in bullying. This may encourage the bullying to continue.
- **Outsiders**: These children remain separate from the bullying situation. They neither reinforce the bullying behavior nor defend the child being bullied. Some may watch what is going

on but do not provide feedback about the situation to show they are on anyone's side. Even so, providing an audience may encourage bullying behavior. These kids often want to help, but do not know how. Learn how to be "more than a bystander."

- **Kids who Defend:** These children actively comfort the child being bullied and may come to the child's defense when bullying occurs.

Most kids play more than one role in bullying over time. In some cases, they may be directly involved in bullying as the one bullying others or being bullied and in others, they may witness bullying and play an assisting or defending role. Every situation is different. Some kids are both bullied and bully others. It is important to note the multiple roles kids play, because:[28]

Children at Risk of Being Bullied

No single factor puts a child at risk of being bullied or bullying others. Bullying can happen anywhere—cities, suburbs, or rural towns. Depending on the environment, some groups—such as lesbian, gay, bisexual, transgender, or questioning (LGBTQ) youth, youth with disabilities, and socially isolated youth—may be at an increased risk of being bullied. Generally, children who are bullied have one or more of the following risk factors:

- Are perceived as different from their peers, such as being overweight or underweight, wearing glasses or different clothing, being new to a school, or being unable to afford what

28. United States Department of Health and Human Services. Public Domain: No Known Copyright

kids consider "cool"
- Are perceived as weak or unable to defend themselves
- Are depressed, anxious, or have low self-esteem
- Are less popular than others and have few friends
- Do not get along well with others, seen as annoying or provoking, or antagonize others for attention

Children More Likely to Bully Others

There are two types of kids who are more likely to bully others:

- Some are well-connected to their peers, have social power, are overly concerned about their popularity, and like to dominate or be in charge of others.
- Others are more isolated from their peers and may be depressed or anxious, have low self-esteem, be less involved in school, be easily pressured by peers, or not identify with the emotions or feelings of others.

Children who have these factors are also more likely to bully others:

- Are aggressive or easily frustrated
- Have less parental involvement or having issues at home
- Think badly of others
- Have difficulty following rules
- View violence in a positive way
- Have friends who bully others

Remember, those who bully others do not need to be stronger or bigger than those they bully. The power imbalance can come from several sources—popularity, strength, cognitive ability—and

children who bully may have more than one of these characteristics.[29]

Warning Signs for Bullying

There are many warning signs that may indicate that someone is affected by bullying—either being bullied or bullying others. Recognizing the warning signs is an important first step in acting against bullying. Not all children who are bullied or are bullying others ask for help. It is important to talk with children who show signs of being bullied or bullying others. These warning signs can also point to other issues or problems, such as depression or substance abuse. Talking to the child can help identify the root of the problem.

Signs a Child Is Being Bullied

Look for changes in the child. However, be aware that not all children who have been bullied exhibit warning signs. Some signs that may point to a bullying problem are:

- Unexplainable injuries
- Lost or destroyed clothing, books, electronics, or jewelry
- Frequent headaches or stomach aches, feeling sick or faking illness
- Changes in eating habits, like suddenly skipping meals or binge eating. Kids may come home from school hungry because they did not eat lunch.

29. United States Department of Health and Human Services. Public Domain: No Known Copyright

- Difficulty sleeping or frequent nightmares

A child with an unexplained injury may have been bullied. [30]

Signs a Child is Bullying Others

Kids may be bullying others if they:

- Get into physical or verbal fights
- Have friends who bully others
- Are increasingly aggressive
- Get sent to the principal's office or to detention frequently
- Have unexplained extra money or new belongings

30. Image retrieved from Pixabay.com is licensed under CC0.

Effects of Bullying

Bullying can affect everyone—those who are bullied, those who bully, and those who witness bullying. Bullying is linked to many negative outcomes including impacts on mental health, substance use, and suicide. It is important to talk to kids to determine whether bullying—or something else—is a concern.

Kids Who Are Bullied

Kids who are bullied can experience negative physical, school, and mental health issues. Kids who are bullied are more likely to experience:

- Depression and anxiety, increased feelings of sadness and loneliness, changes in sleep and eating patterns, and loss of interest in activities they used to enjoy. These issues may persist into adulthood.
- Health complaints
- Decreased academic achievement—GPA and standardized test scores—and school participation. They are more likely to miss, skip, or drop out of school.
- A very small number of bullied children might retaliate through extremely violent measures. In 12 of 15 school shooting cases in the 1990s, the shooters had a history of being bullied.

Kids Who Bully Others

Kids who bully others can also engage in violent and other risky behaviors into adulthood. Kids who bully are more likely to:

- Abuse alcohol and other drugs in adolescence and as adults.
- Get into fights, vandalize property, and drop out of school.
- Engage in early sexual activity.
- Have criminal convictions and traffic citations as adults.
- Be abusive toward their romantic partners, spouses, or children as adults.

Bystanders

Kids who witness bullying are more likely to:

- Have increased use of tobacco, alcohol, or other drugs.
- Have increased mental health problems, including depression and anxiety.
- Miss or skip school.[31]

Cyberbullying

Cyberbullying is bullying that takes place over digital devices like cell phones, computers, and tablets. Cyberbullying can occur through SMS, Text, and apps, or online in social media, forums, or gaming where people can view, participate in, or share content. Cyberbullying includes sending, posting, or sharing negative, harmful, false, or mean content about someone else. It can include sharing personal or private information about someone else causing embarrassment or humiliation. Some cyberbullying crosses the line into unlawful or criminal behavior.

31. United States Department of Health and Human Services. Public Domain: No Known Copyright

The most common places where cyberbullying occurs are:

- Social Media, such as Facebook, Instagram, Snapchat, and Tik Tok
- Text messaging and messaging apps on mobile or tablet devices
- Instant messaging, direct messaging, and online chatting over the internet
- Online forums, chat rooms, and message boards, such as Reddit
- Email
- Online gaming communities[32]

Online chatting is one place for cyberbullying. [33]

32. U.S. Department of Health and Human Services: stopbullying.gov
33. mages retrieved from Pixabay.com are licensed under CC0.

Children who are cyberbullied are more likely to: experience in-person bullying, be unwilling to attend school, receive poor grades, use alcohol and drugs, skip school, have lower self-esteem, and have more health problems (Stopbullying.gov, 2018). The National Center for Education Statistics indicate that between 2011-2017, 14.9% of students in grades 9-12 experienced bullying and experienced cyberbullying. Results reported in 2017 showed that females, (19.7%) were cyberbullied more than twice as often as males, (9.9%), and homosexuals and bisexuals (27.1%) were cyberbullied more than twice as often as heterosexuals (13.3%). The table below shows the percentage of students in grades 9-12 who have reported being cyberbullied by selected student characteristics.[34]

[Standard errors appear in parentheses]

Student characteristic	2011		2013		2015		2017	
Total	16.2	(0.49)	14.8	(0.54)	15.5	(0.53)	14.9	(0.61)
Sex								
Male	10.8	(0.60)	8.5	(0.45)	9.7	(0.66)	9.9	(0.57)
Female	22.1	(0.66)	21.0	(0.81)	21.7	(0.92)	19.7	(1.20)
Race/ethnicity								
White	18.6	(0.71)	16.9	(0.84)	18.4	(0.78)	17.5	(1.88)
Black	8.9	(0.68)	8.7	(0.79)	8.6	(0.97)	10.9	(1.01)
Hispanic	13.6	(0.80)	12.8	(0.88)	12.4	(0.87)	12.3	(0.60)
Asian	14.4	(2.48)	12.9	(1.70)	13.8	(2.42)	13.0	(1.48)
Pacific Islander	19.6	(5.29)	15.7	(3.46)	11.8	(4.27)	15.0	(2.75)
American Indian/Alaska Native	16.2	(3.56)	18.0	(4.36)	16.7	(3.67)	13.2	(3.79)
Two or more races	21.3	(2.16)	18.9	(1.94)	20.4	(2.40)	16.0	(2.22)
Sexual orientation								
Heterosexual	—	(†)	—	(†)	14.2	(0.58)	13.3	(1.48)
Gay, lesbian, or bisexual	—	(†)	—	(†)	28.0	(2.06)	27.1	(2.04)
Not sure	—	(†)	—	(†)	23.5	(2.56)	22.0	(2.73)
Grade								
9th	15.5	(0.78)	15.1	(1.05)	16.5	(1.00)	16.7	(0.67)
10th	18.1	(0.90)	14.8	(1.20)	16.8	(0.96)	14.8	(0.73)
11th	16.0	(1.18)	14.9	(0.98)	14.7	(1.17)	14.2	(1.20)
12th	15.0	(0.88)	13.5	(0.67)	14.3	(1.48)	13.5	(1.12)

34. Child Growth and Development: An Open Educational Resources Publication by College of the Canyons by Jennifer Paris, Antoinette Ricardo, and Dawn Richmond is licensed under CC BY 4.0 (modified by Maria Pagano)

Percentage of students in grades 9–12 who reported having been electronically bullied during the previous 12 months, by selected student characteristics: Selected years, 2011 through 2017. [35]

—Not available.

†Not applicable.

!Interpret data with caution. The coefficient of variation (CV) for this estimate is between 30 and 50 percent.

1 Students were asked which sexual orientation–"heterosexual (straight)," "gay or lesbian," "bisexual," or "not sure"–best described them.

NOTE: Electronic bullying includes "being bullied through e-mail, chat rooms, instant messaging, websites, or texting" for 2011 through 2015, and "being bullied through texting, Instagram, Facebook, or other social media" for 2017. Race categories exclude persons of Hispanic ethnicity.

With the prevalence of social media and digital forums, comments, photos, posts, and content shared by individuals can often be viewed by strangers as well as acquaintances. The content an individual shares online – both their personal content as well as any negative, mean, or hurtful content – creates a kind of permanent public record of their views, activities, and behavior.

35. National Center for Education Statistics (NCES): Digest of Education Statistics Centers for Disease Control and Prevention, Division of Adolescent and School Health, Youth Risk Behavior Surveillance System (YRBSS), 2011 through 2017. (This table was prepared August 2018.)

This public record can be thought of as an online reputation, which may be accessible to schools, employers, colleges, clubs, and others who may be researching an individual now or in the future. Cyberbullying can harm the online reputations of everyone involved – not just the person being bullied, but those doing the bullying or participating in it. Cyberbullying has unique concerns in that it can be:

- **Persistent** – Digital devices offer an ability to immediately and continuously communicate 24 hours a day, so it can be difficult for children experiencing cyberbullying to find relief.
- **Permanent** – Most information communicated electronically is permanent and public, if not reported and removed. A negative online reputation, including for those who bully, can impact college admissions, employment, and other areas of life.
- **Hard to Notice** – Because teachers and parents may not overhear or see cyberbullying taking place, it is harder to recognize.[36]

Warning Signs of Cyberbullying

A child may be involved in cyberbullying in several ways. A child can be bullied, bully others, or witness bullying. Parents, teachers, and other adults may not be aware of all the digital media and apps that a child is using. The more digital platforms that a child uses, the more opportunities there are for being exposed to potential cyberbullying. Many of the warning signs that cyberbullying is occurring happen around a child's use of their device. Some of the warning signs that a child may be involved in cyberbullying are:

36. U.S. Department of Health and Human Services: stopbullying.gov

- Noticeable increases or decreases in device use, including texting.
- A child exhibits emotional responses (laughter, anger, upset) to what is happening on their device.
- A child hides their screen or device when others are near and avoids discussion about what they are doing on their device.
- Social media accounts are shut down or new ones appear.
- A child starts to avoid social situations, even those that were enjoyed in the past.
- A child becomes withdrawn or depressed or loses interest in people and activities.

What to Do When Cyberbullying Happens

If you notice warning signs that a child may be involved in cyberbullying, take steps to investigate that child's digital behavior. Cyberbullying is a form of bullying, and adults should take the same approach to address it: support the child being bullied, address the bullying behavior of a participant, and show children that cyberbullying is taken seriously. Because cyberbullying happens online, responding to it requires different approaches. If you think that a child is involved in cyberbullying, there are several things you can do:

- **Notice** – Recognize if there has been a change in mood or behavior and explore what the cause might be. Try to determine if these changes happen around a child's use of their digital devices.
- **Talk** –Ask questions to learn what is happening, how it started, and who is involved.
- **Document** –Keep a record of what is happening and where. Take screenshots of harmful posts or content if possible. Most laws and policies note that bullying is a repeated behavior, so

records help to document it.

- **Report** –Most social media platforms and schools have clear policies and reporting processes. If a classmate is cyberbullying, report it to the school. You can also contact apps or social media platforms to report offensive content and have it removed. If a child has received physical threats, or if a potential crime or illegal behavior is occurring, report it to the police.
- **Support** –Peers, mentors, and trusted adults can sometimes intervene publicly to positively influence a situation where negative or hurtful content posts about a child. Public Intervention can include posting positive comments about the person targeted with bullying to try to shift the conversation in a positive direction. It can also help to reach out to the child who is bullying and the target of the bullying to express your concern. If possible, try to determine if more professional support is needed for those involved, such as speaking with a guidance counselor or mental health professional. [37]

Laws, Policies, and Regulations Regarding Cyberbullying

State and local lawmakers have taken action to prevent bullying and protect children. Each jurisdiction, including all 50 states, the District of Columbia, and U.S. territories (state), addresses bullying differently. Some have established laws, policies, and regulations. Others have developed model policies that schools and local educational agencies (districts) can use as they develop their own local laws, policies, and regulations. Most state laws, policies, and regulations require districts and schools to implement a bullying

37. U.S. Department of Health and Human Services: stopbullying.gov

policy and procedures to investigate and respond to bullying when it occurs. A handful of states also require bullying prevention programs, inclusion of bullying prevention in health education standards, and/or teacher professional development. These state laws generally do not prescribe specific consequences for kids who engage in bullying behavior, and very few classify bullying as a criminal offense. Further, states may address bullying, cyberbullying, and related behaviors in a single law or across multiple laws. In some cases, bullying appears in the criminal code of a state that may apply to juveniles.

In December 2010, the U.S. Department of Education developed a framework of common components found in state laws, policies, and regulations focused on bullying at the time. The framework was used to describe how schools were taking action to prevent and respond to bullying incidents. The common components found in state laws, policies, and regulations− which have evolved over time−include definitions of bullying, defining characteristics that are commonly targeted for bullying behaviors, and detailed requirements for school district policies.[38]

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38. U.S. Department of Health and Human Services: stopbullying.gov

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13. Contexts of Development

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Family

What is family?

In J.K. Rowling's famous Harry Potter novels, the boy magician lives in a cupboard under the stairs. His unfortunate situation is the result of his wizarding parents having been killed in a duel, causing the young Potter to be subsequently shipped off to live with his cruel aunt and uncle. Although the family may not be the central theme of these wand and sorcery novels, Harry's example raises a compelling question: what, exactly, counts as family?

   The definition of family changes across time and across cultures. A traditional family has been defined as two or more people who are related by blood, marriage, and—occasionally—adoption (Murdock, 1949). Historically, the most standard version of the traditional family has been the two-parent family. Are there people in your life you consider family who are not necessarily related to you in the traditional sense? Harry Potter would undoubtedly call his schoolmates Ron Weasley and Hermione Granger family, even though they do not fit the traditional definition. Likewise, Harry might consider Hedwig, his snowy owl, a family member, and he would not be alone in doing so. Research from the US (Harris, 2015) and Japan (Veldkamp, 2009) finds that many pet owners consider their pets to be members of the family. Another traditional form of family is the joint family, in which three or more generations of blood relatives live in a single household or compound. Joint families often include cousins, aunts, uncles, and other relatives from the extended family. Versions of the joint family system exist around the globe including in South Asia, Southern Europe, the South Pacific, and other locations.

   In more modern times, the traditional definition of family has been criticized as being too narrow. Modern families—especially those in industrialized societies—exist in many forms, including the

single-parent family, foster families, same-sex couples, childfree families, and many other variations from traditional norms. Common to each of these family forms is commitment, caring, and close emotional ties—which are increasingly the defining characteristics of family (Benokraitis, 2015). The changing definition of family has come about, in part, because of factors such as divorce and re-marriage. In many cases, people do not grow up with their family of orientation but become part of a stepfamily or blended family. Whether a single-parent, joint, or two-parent family, a person's family of orientation or the family into which he or she is born, generally acts as the social context for young children learning about relationships.

According to Bowen (1978), each person has a role to play in his or her family, and each role comes with certain rules and expectations. This system of rules and roles is known as **family systems theory**. The goal for the family is stability: rules and expectations that work for all. The family rules and expectations change when the role of one family member changes. Such changes ripple through the family and cause each member to adjust his or her own role and expectations to compensate for the change.

Gender has been one factor by which family roles have long been assigned. Traditional roles have historically placed housekeeping and childrearing squarely in the realm of women's responsibilities. Men, by contrast, have been seen as protectors and as providers of resources including money. Increasingly, families are crossing these traditional roles with women working outside the home and men contributing more to domestic and childrearing responsibilities. Despite this shift toward more egalitarian roles, women still tend to do more housekeeping and childrearing tasks than their husbands (known as the second shift) (Hochschild & Machung, 2012).

Interestingly, parental roles have an impact on the ambitions of their children. Croft and her colleagues (2014) examined the beliefs of more than 300 children. The researchers discovered that when fathers endorsed more equal sharing of household duties and when mothers were more workplace oriented it influenced how their

daughters thought. In both cases, daughters were more likely to have ambitions toward working outside the home and working in less gender-stereotyped professions. [2]

Family Atmosphere

One of the ways to assess the quality of family life is to consider the tasks of families. Berger (2005) lists five family functions:

1. Providing food, clothing, and shelter
2. Encouraging learning
3. Developing self-esteem
4. Nurturing friendships with peers
5. Providing harmony and stability

2. "Child, Family, and Community" by Rebecca Laff and Wendy Ruiz, College of the Canyons is licensed under CC BY 4.0 / A derivative from the original work

There are five functions of the family environment. [3]

   Notice that in addition to providing food, shelter, and clothing, families are responsible for helping the child learn, relate to others, and have a confident sense of self. The family provides a harmonious and stable environment for living. A good home environment is one in which the child's physical, cognitive, emotional, and social needs are adequately met. Sometimes families emphasize physical needs but ignore cognitive or emotional needs. Other times, families pay close attention to physical needs and academic requirements but

3. Images retrieved from pixabay.com are licensed under CC0

may fail to nurture the child's friendships with peers or guide the child toward developing healthy relationships. Parents might want to consider how it feels to live in the household. Is it stressful and conflict-ridden? Is it a place where family members enjoy being?

The Family Stress Model

Family relationships are significantly affected by conditions outside the home. For instance, the **Family Stress Model** describes how financial difficulties are associated with parents' depressed moods, which in turn lead to marital problems and poor parenting that contributes to poorer child adjustment (Conger, Conger, & Martin, 2010). Within the home, parental marital difficulty or divorce affects more than half the children growing up today in the United States. Divorce is typically associated with economic stresses for children and parents, the renegotiation of parent-child relationships (with one parent typically as primary custodian and the other assuming a visiting relationship), and many other significant adjustments for children. Divorce is often regarded by children as a sad turning point in their lives, although for most it is not associated with long-term problems of adjustment (Emery, 1999).

Family Forms

The sociology of the family examines the family as an institution and a unit of socialization. Sociological studies of the family look at demographic characteristics of the family members: family size, age, ethnicity and gender of its members, social class of the family, the economic level and mobility of the family, professions of its members, and the education levels of the family members.

Currently, one of the biggest issues that sociologists study is the changing roles of family members. Often, each member is restricted by the gender roles of the traditional family. These roles, such as

the father as the breadwinner and the mother as the homemaker, are declining. Now, the mother is often the supplementary provider while retaining the responsibilities of child-rearing. In this scenario, females' role in the labor force is "compatible with the demands of the traditional family." Sociology studies have examined the adaptation of males' roles as caregivers as well as providers. The gender roles are becoming increasingly interwoven and various other family forms are becoming more common.

Families Without Children

Families do not always include children. [4]

Singlehood families contains a person who is not married or in a common-law relationship. He or she may share a relationship with a partner but lead a single lifestyle. Couples that are childless are often overlooked in the discussion of families.

Families with One Parent

4. Images retrieved from pixabay.com are licensed under CC0

> A family in which one parent has the majority of day-to-day responsibilities for raising their child or children. [5]

A single-parent family usually refers to a parent who has most of the day-to-day responsibilities in the raising of the child or children, who is not living with a spouse or partner, or who is not married. The dominant caregiver is the parent with whom the children reside for the majority of the time; if the parents are separated or divorced, children live with their custodial parent and have visitation with their noncustodial parent. In western society in general, following a separation a child will end up with the primary caregiver, usually the mother, and a secondary caregiver, usually the father. Single parent by choice families refers to a family that

5. Images retrieved from pixabay.com are licensed under CC0

a single person builds by choice. These families can be built with the use of assisted reproductive technology and donor gametes (sperm and/or egg) or embryos, surrogacy, foster or kinship care, and adoption.

Two-Parent Families

> While the traditional family structure is common in the U.S., it is not the most common type of family worldwide. [6]

6. Images retrieved from pixabay.com are licensed under CC0

The **nuclear family** is often referred to as the traditional family structure. It includes two married parents and children. While common in industrialized cultures (such as the U.S.), it is not actually the most common type of family worldwide **Cohabitation** is an arrangement where two people, who are not married, live together in an intimate relationship, particularly an emotionally and/or sexually intimate one, on a long-term or permanent basis. Today, cohabitation is a common pattern among people in the Western world. More than two-thirds of married couples in the U.S. say that they lived together before getting married.

Gay and lesbian couples with children have same-sex families. While now recognized legally in the United States, discrimination against same-sex families is not uncommon. According to the American Academy of Pediatrics, there is "ample evidence to show that children raised by same-gender parents fare as well as those raised by heterosexual parents. More than 25 years of research have documented that there is no relationship between parents' sexual orientation and any measure of a child's emotional, psychosocial, and behavioral adjustment. Conscientious and nurturing adults, whether they are men or women, heterosexual or homosexual, can be excellent parents. The rights, benefits, and protections of civil marriage can further strengthen these families."

A **blended family** describes families with mixed parents: one or both parents remarried, bringing children of the former family into the new family31. Blended families are complex in a number of ways that can pose unique challenges to those who seek to form successful stepfamily relationships (Visher & Visher, 1985). These families are also referred to as stepfamilies.

Families That Include Additional Adults

An **extended family** includes three generations, grandparents, parents, and children. This is the most common type of family worldwide.

Families by choice are relatively newly recognized. It was popularized by the LGBTQ community to describe a family not recognized by the legal system. It may include adopted children, live-in partners, kin of each member of the household, and close friends. Increasingly family by choice is being practiced by those who see the benefit of including people beyond blood relatives in their families. While most families in the U.S. are **monogamous**,

7. Image retrieved from pixabay.com are licensed under CC0

some families have more than two married parents. These families are polygamous. **Polygamy** is illegal in all 50 states, but it is legal in other parts of the world.

Kinship families are those in which the full-time care, nurturing, and protection of a child is provided by relatives, members of their tribe or clan, godparents, stepparents, or other adults who have a family relationship with a child. When children cannot be cared for by their parents, research finds benefits to kinship care.

When a person assumes the parenting of another, usually a child, from that person's biological or legal parent or parents this creates adoptive families. Legal **adoption** permanently transfers all rights and responsibilities and is intended to affect a permanent change in status and as such requires societal recognition, either through legal or religious sanction. Adoption can be done privately, through an agency, or through foster care in the U.S. or from abroad. Adoptions can be closed (no contact with birth/biological families or open, with different degrees of contact with birth/biological families). Couples, both opposite and same-sex, and single parents can adopt (although not all agencies and foreign countries will work with unmarried, single, or same-sex intended parents).

When parents are not of the same ethnicity, they build interracial families. Until the decision in Loving v Virginia in 1969, this was not legal in the U.S. There are other parts of the world where marrying someone outside of your race (or social class) has legal and social ramifications. These families may experience issues unique to each individual family's culture.

Changes in Families

The tasks of families listed above are functions that can be fulfilled in a variety of family types—not just intact, two-parent households. Harmony and stability can be achieved in many family forms and when it is disrupted, either through a divorce, efforts to blend

families, or any other circumstances, the child suffers (Hetherington & Kelly, 2002). Changes continue to happen, but for children, they are especially vulnerable. Divorce and how it impacts children depends on how the caregivers handle the divorce as well as how they support the emotional needs of the child.

Divorce

A lot of attention has been given to the impact of **divorce** on the life of children. The assumption has been that divorce has a strong, negative impact on the child and that single-parent families are deficient in some way. However, 75-80 percent of children and adults who experience divorce suffer no long-term effects (Hetherington & Kelly, 2002). An objective view of divorce, re-partnering, and remarriage indicate that divorce, remarriage, and life in stepfamilies can have a variety of effects.

Factors Affecting the Impact of Divorce

As you look at the consequences (both pro and con) of divorce and remarriage on children, keep these family functions in mind. Some negative consequences are a result of financial hardship rather than divorce per se (Drexler, 2005). Some positive consequences reflect improvements in meeting these functions. For instance, we have learned that positive self-esteem comes in part from a belief in the self and one's abilities rather than merely being complemented by others. In single-parent homes, children may be given more opportunities to discover their own abilities and gain independence that fosters self-esteem. If divorce leads to fighting between the parents, and the child is included in these arguments, their self-esteem may suffer.

The impact of divorce on children depends on a number of

factors. The degree of conflict prior to the divorce plays a role. If the divorce means a reduction in tensions, the child may feel relief. If the parents have kept their conflicts hidden, the announcement of a divorce can come as a shock and be met with enormous resentment. Another factor that has a great impact on the child concerns financial hardships they may suffer, especially if financial support is inadequate. Another difficult situation for children of divorce is the position they are put into if the parents continue to argue and fight—especially if they bring the children into those arguments.

Short-term consequences: In roughly the first year following divorce, children may exhibit some of these short-term effects:

1. **Grief over losses suffered**. The child will grieve the loss of the parent they no longer see as frequently. The child may also grieve about other family members that are no longer available. Grief sometimes comes in the form of sadness but it can also be experienced as anger or withdrawal. Older children may feel depressed.

2. **Reduced Standard of Living**. Very often, divorce means a change in the amount of money coming into the household. Children experience new constraints on spending or entertainment. School-aged children, especially, may notice that they can no longer have toys, clothing, or other items to which they've grown accustomed. Or it may mean that there is less eating out or being able to afford cable television, and so on. The custodial parent may experience stress at not being able to rely on child support payments or having the same level of income as before. This can affect decisions regarding healthcare, vacations, rents, mortgages, and other expenditures. Furthermore, stress can result in less happiness and relaxation in the home. The parent who has to take on more work may also be less available to the children.

3. **Adjusting to Transitions**. Children may also have to adjust to other changes accompanying a divorce. The divorce might mean moving to a new home and changing schools or friends.

It might mean leaving a neighborhood that has meant a lot to them as well.

Long-Term consequences: Here are some effects that go beyond just the first year following a divorce.

1. **Economic/Occupational Status**. One of the most commonly cited long-term effects of divorce is that children of divorce may have lower levels of education or occupational status. This may be a consequence of lower income and fewer resources for funding education, rather than the divorce per se. In those households where economic hardship does not occur, there may be no impact on economic status (Drexler, 2005).
2. **Improved Relationships with the Custodial Parent** (usually the mother): Most children of divorce lead happy, well-adjusted lives and develop stronger, positive relationships with their custodial parent (Seccombe and Warner, 2004). Others have also found that relationships between mothers and children become closer and stronger (Guttman, 1993) and suggest that greater equality and less rigid parenting is beneficial after divorce (Steward, Copeland, Chester, Malley, and Barenbaum, 1997).
3. **Greater emotional independence in sons**. Drexler (2005) notes that sons who are raised by mothers only develop an emotional sensitivity to others that is beneficial in relationships.
4. **Feeling more anxious in their own love relationships.** Children of divorce may feel more anxious about their own relationships as adults. This may reflect a fear of divorce if things go wrong, or it may be a result of setting higher expectations for their own relationships.
5. **Adjustment of the custodial parent**. Furstenberg and Cherlin (1991) believe that the primary factor influencing the way that children adjust to divorce is the way the custodial parent adjusts to the divorce. If that parent is adjusting well, the

children will benefit. This may explain a good deal of the variation we find in children of divorce.[8]

Socialization in childhood and adolescence

Parenting Styles

Developmental psychologists have been interested in how parents influence the development of children's social and instrumental competence since at least the 1920s. One of the most robust approaches to this area is the study of what has been called "parenting style." We will explore four types of **parenting styles** and then discuss the consequences of the different styles for children.

Parenting is a complex activity that includes many specific behaviors that work individually and together to influence child outcomes. Although specific parenting behaviors, such as spanking or reading aloud, may influence child development, looking at any specific behavior in isolation may be misleading. Many writers have noted that specific parenting practices are less important in predicting child well-being than in the broad pattern of parenting. Most researchers who attempt to describe this broad parental milieu rely on **Diana Baumrind's** concept of parenting style. The construct of parenting style is used to capture normal variations in parents' attempts to control and socialize their children (Baumrind, 1991). Two points are critical in understanding this definition. First, parenting style is meant to describe normal variations in parenting. In other words, the parenting style typology Baumrind developed

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should not be understood to include deviant parenting, such as might be observed in abusive or neglectful homes. Second, Baumrind assumes that normal parenting revolves around issues of control. Although parents may differ in how they try to control or socialize their children and the extent to which they do so, it is assumed that the primary role of all parents is to influence, teach, and control their children.

Parenting style captures two important elements of parenting: **parental responsiveness** and **parental demandingness** (Maccoby & Martin, 1983). Parental responsiveness (also referred to as parental warmth or supportiveness) refers to "the extent to which parents intentionally foster individuality, self-regulation, and self-assertion by being attuned, supportive, and acquiescent to children's special needs and demands" (Baumrind, 1991, p. 62). Parental demandingness (also referred to as behavioral control) refers to "the claims parents make on children to become integrated into the family whole, by their maturity demands, supervision, disciplinary efforts and willingness to confront the child who disobeys" (Baumrind, 1991, pp. 61- 62).

Baumrind's Four Parenting Styles in Depth

Categorizing parents according to whether they are high or low on parental demandingness and responsiveness creates a typology of four parenting styles: indulgent, authoritarian, authoritative, and uninvolved (Maccoby & Martin, 1983). Each of these parenting styles reflects different naturally occurring patterns of parental values, practices, and behaviors (Baumrind, 1991) and a distinct balance of responsiveness and demandingness.

	Support	
	Low	**High**
Demandingness **Low**	Uninvolved	Permissive
High	Authoritarian	Authoritative

The four types of parenting styles [9]

Indulgent parents (also referred to as "permissive" or "nondirective") are more responsive than they are demanding. They are nontraditional and lenient, do not require mature behavior, allow considerable self-regulation, and avoid confrontation" (Baumrind, 1991, p. 62). Indulgent parents may be further divided

9. Image retrieved from "Child, Family, and Community" by Rebecca Laff and Wendy Ruiz, College of the Canyons is licensed under CC BY 4.0 / A derivative from the original work[4] "Child, Family, and Community" by Rebecca Laff and Wendy Ruiz, College of the Canyons is licensed under CC BY 4.0 / A derivative from the original work

into two types: democratic parents, who, though lenient, are more conscientious, engaged, and committed to the child, and nondirective parents. **Authoritarian parents** are highly demanding and directive, but not responsive. "They are obedience- and status-oriented, and expect their orders to be obeyed without explanation" (Baumrind, 1991, p. 62). These parents provide well-ordered and structured environments with clearly stated rules. Authoritarian parents can be divided into two types: nonauthoritarian-directive, who are directive, but not intrusive or autocratic in their use of power, and authoritarian-directive, who are highly intrusive. **Authoritative parents** are both demanding and responsive. "They monitor and impart clear standards for their children's conduct. They are assertive, but not intrusive and restrictive. Their disciplinary methods are supportive, rather than punitive. They want their children to be assertive, as well as socially responsible and self-regulated, as well as cooperative" (Baumrind, 1991, p. 62). **Uninvolved parents** are low in both responsiveness and demandingness. In extreme cases, this parenting style might encompass both rejecting-neglecting and neglectful parents, although most parents of this type fall within the normal range. Because parenting style is a typology, rather than a linear combination of responsiveness and demandingness, each parenting style is more than and different from the sum of its parts (Baumrind, 1991). In addition to differing in responsiveness and demandingness, the parenting styles also differ in the extent to which they are characterized by a third dimension: **psychological control**. Psychological control "refers to control attempts that intrude into the psychological and emotional development of the child" (Barber, 1996, p. 3296) through the use of parenting practices such as guilt induction, withdrawal of love, or shaming. One key difference between authoritarian and authoritative parenting is in the dimension of psychological control. Both authoritarian and authoritative parents place high demands on their children and expect their children to behave appropriately and obey parental rules. Authoritarian parents, however, also expect their children

to accept their judgments, values, and goals without questioning. In contrast, authoritative parents are more open to give and take with their children and make greater use of explanations. Thus, although authoritative and authoritarian parents are equally high in behavioral control, authoritative parents tend to be low in psychological control, while authoritarian parents tend to be high.

Consequences for Children

Parenting style has been found to predict child well-being in the domains of social competence, academic performance, psychosocial development, and problem behavior. Research in the United States, based on parent interviews, child reports, and parent observations consistently finds:

- Children and adolescents whose parents are authoritative rate themselves and are rated by objective measures as more socially and instrumentally competent than those whose parents are nonauthoritative (Baumrind, 1991; Weiss & Schwarz, 1996; Miller et al., 1993).
- Children and adolescents whose parents are uninvolved perform most poorly in all domains.
- In general, parental responsiveness predicts social competence and psychosocial functioning, while parental demandingness is associated with instrumental competence and behavioral control (i.e., academic performance and deviance). These findings indicate:
- Children and adolescents from authoritarian families (high in demandingness, but low in responsiveness) tend to perform moderately well in school and be uninvolved in problem behavior, but they have poorer social skills, lower self-esteem, and higher levels of depression.
- Children and adolescents from indulgent homes (high in

responsiveness, low in demandingness) are more likely to be involved in problem behavior and perform less well in school, but they have higher self-esteem, better social skills, and lower levels of depression.

In reviewing the literature on parenting style, one is struck by the consistency with which authoritative upbringing is associated with both instrumental and social competence and lower levels of problem behavior in both boys and girls at all developmental stages. The benefits of authoritative parenting and the detrimental effects of uninvolved parenting are evident as early as the preschool years and continue throughout adolescence and into early adulthood. Although specific differences can be found in the competence evidenced by each group, the largest differences are found between children whose parents are unengaged and their peers with more involved parents. [10]

Spanking

Spanking is often thought of as a rite of passage for children, and this method of discipline continues to be endorsed by the majority of parents (Smith, 2012). Just how effective is spanking, however, and are there any negative consequences? After reviewing the research, Smith (2012) states "many studies have shown that physical punishment, including spanking, hitting and other means of causing pain, can lead to increased aggression, antisocial behavior, physical injury and mental health problems for children" (p. 60). Gershoff, (2008) reviewed decades of research and recommended that parents and caregivers make every effort to avoid physical

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punishment and called for the banning of physical discipline in all U.S. schools.

In a longitudinal study that followed more than 1500 families from 20 U.S. cities, parents' reports of spanking were assessed at ages three and five (MacKenzie, Nicklas, Waldfogel, & Brooks-Gunn, 2013). Measures of externalizing behavior and receptive vocabulary were assessed at age nine. Results indicated that those children who were spanked at least twice a week by their mothers scored 2.66 points higher on a measure of aggression and rule-breaking than those who were never spanked. Additionally, those who were spanked less still scored 1.17 points higher than those never spanked. When fathers did the spanking, those spanked at least two times per week scored 5.7 points lower on a vocabulary test than those never spanked. This study revealed the negative cognitive effects of spanking in addition to the increase in aggressive behavior.

Internationally, physical discipline is increasingly being viewed as a violation of children's human rights. According to Save the Children (2019), 46 countries have banned the use of physical punishment, and the United Nations Committee on the Rights of the Child (2014) called physical punishment "legalized violence against children" and advocated that physical punishment be eliminated in all settings. [11]

The use of **positive reinforcement** in changing behavior is almost always more effective than using punishment. This is because positive reinforcement makes the person feel better, helping create a positive relationship with the person providing the reinforcement. Examples of positive reinforcement that are effective in everyday

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life include verbal praise or approval, the awarding of the desired item, and money. **Punishment,** on the other hand, is more likely to create only temporary changes in behavior because it is based on coercion and typically creates a negative and adversarial relationship with the person providing the reinforcement. When the person who provides the punishment leaves the situation, the unwanted behavior is likely to return.[12]

Effective Discipline

Today's psychologists and parenting experts favor reinforcement over punishment—they recommend that you catch your child doing something good and reward him/her for it. An example of this is **shaping.** Skinner often used an approach called shaping. Instead of rewarding only the target behavior, in shaping, we reinforce successive approximations of a target behavior. Why is shaping needed? Remember that in order for reinforcement to work, the child must first display the behavior. Shaping is needed because it is extremely *unlikely* that the child will display anything but the simplest of behaviors spontaneously. In shaping, behaviors are broken down into many small, achievable steps. The specific steps used in the process are the following:

- Reinforce any response that resembles the desired behavior.
- Then reinforce the response that more closely resembles the desired behavior. You will no longer reinforce the previously reinforced response.
- Next, begin to reinforce the response that even more closely resembles the desired behavior.

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- Continue to reinforce closer and closer approximations of the desired behavior.
- Finally, only reinforce the desired behavior.

Let's consider parents whose goal is to have their son learn to clean his room. They use shaping to help him master steps toward the goal. Instead of performing the entire task, they set up these steps and reinforce each step. First, he cleans up one toy. Second, he cleans up five toys. Third, he chooses whether to pick up ten toys or put his books and clothes away. Fourth, he cleans up everything except two toys. Finally, he cleans his entire room.[13]

Other alternatives that are advocated by child development specialists include:

- Praising and modeling appropriate behavior
- Providing time-outs for inappropriate behavior
- Giving choices
- Helping the child identify emotions and learning to calm down
- Ignoring small annoyances (e.g., using extinction for an undesirable behavior that has been inadvertently reinforced, such as discontinuing attention when a child has a tantrum)
- Withdrawing privileges for undesirable behavior (e.g., a teenager loses car privilege for coming home intoxicated)[14]

Autonomy and Attachment

While most adolescents get along with their parents, they do spend

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less time with them (Smetana, 2011). This decrease in the time spent with families may be a reflection of a *teenager's greater desire for independence* or **autonomy.** It can be difficult for many parents to deal with this desire for autonomy. However, it is likely adaptive for teenagers to increasingly distance themselves and establish relationships outside of their families in preparation for adulthood. This means that both parents and teenagers need to strike a balance between autonomy, while still maintaining close and supportive familial relationships.

Children in middle and late childhood are increasingly granted greater freedom regarding moment-to-moment decision-making. This continues in adolescence, as teens are demanding greater control in decisions that affect their daily lives. This can increase conflict between parents and their teenagers. For many adolescents, this conflict centers on chores, homework, curfew, dating, and personal appearance. These are all things many teens believe they should manage that parents previously had considerable control over. Teens report more conflict with their mothers, as many mothers believe they should still have some control over many of these areas, yet often report their mothers to be more encouraging and supportive (Costigan, Cauce, & Etchison, 2007). As teens grow older, more compromise is reached between parents and teenagers (Smetana, 2011).

Parents are more controlling of daughters, especially early-maturing girls than they are sons (Caspi, Lynam, Moffitt, & Silva, 1993). In addition, culture and ethnicity also play a role in how restrictive parents are with the daily lives of their children (Chen, Vansteenkiste, Beyers, Soensens, & Van Petegem, 2013).

Having supportive, less conflict-ridden relationships with parents also benefit teenagers. Research on attachment in adolescence finds that teens who are still securely attached to their parents have fewer emotional problems (Rawatlal, Kliewer & Pillay, 2015), and are less likely to engage in drug abuse and other criminal behaviors

(Meeus, Branje & Overbeek, 2004), and have more positive peer relationships (Shomaker & Furman, 2009).[15]

Media

Influences on Development

Children view far more television today than in the 1960s; so much, in fact, that they have been referred to as Generation M (media). The amount of screen time varies by age. As of 2017, children 0-8 spend an average of 2 hours and 19 minutes. Children 8-12 years of age spend almost 6 hours a day on screen media. And 13- to 18-year-olds spend an average of just under hours a day in entertainment media use. [16] Over a year, that adds up to 114 full days watching a screen for fun. That's just the time they spend in front of a screen for entertainment. It doesn't include the time they spend on the computer at school for educational purposes or at home for homework. [17] Given that the American Academy of Pediatrics (AAP) recommends that children should limit media use to 1 to 2

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17. Screen Time vs Lean Time was retrieved from the CDC – public domain

hours per day, then what are the potential effects of all of this screen time? [18]

Cognitive Influences

In a longitudinal study by Katherine Hanson (2017) the impact of television exposure on 12-21 month-old infants on later cognitive and learning outcomes at age 6 to 9 years of age to assess whether parent-child interactions mediate this association. Infants in the video condition were assigned one of two videos that were designed to facilitate parent-infant interactions through co-viewing. Findings indicated that while parents used the video content to engage with their children, there was an overall reduction in the quality and quantity of parent-infant interactions when the TV was on.

At ages 6-9 years old, these same children were tested again on executive functioning, academic, and language assessments during the first half of the laboratory visit.

The results indicate that parent-infant co-viewing has a direct negative association with children's executive function skills, academic achievement, and language during *middle* childhood. In fact, the more children co-viewed with their parents during infancy, the more likely they were to exhibit poorer working memory, academic performance, and language skills during *middle* childhood. In fact, the more children co-viewed with their parents during infancy, the more likely they were to exhibit poorer working memory, academic performance, and language skills.

However, the quality of parent-child interactions or parent language in the presence of television did not moderate this

18. Television and Video Viewing Time Among Children Aged 2 Years --- Oregon, 2006--2007 retrieved from the CDC – public domain

relationship. This study suggests that the effects are not due to actually watching television per se. Rather, the time spent co-viewing during infancy replaces time spent with the parent outside of the television context.[19]

Physical Influences

Children and adolescents are inundated with media and can spend more than 6 hours each day watching television, YouTube, and movies; playing video games; listening to music, and surfing the internet. The use of television and other screen devices (e.g., smartphones, tablets, computers) is associated with the risk of obesity through a variety of mechanisms, including insufficient physical activity and increased calorie intake while using screen devices.[20]

Screen time increases children's risk for obesity because sitting and watching a screen is time that is not spent being physically

19. Hanson, Katherine, "THE INFLUENCE OF EARLY MEDIA EXPOSURE ON CHILDREN'S DEVELOPMENT AND LEARNING" (2017). Doctoral Dissertations. 1011. https://scholarworks.umass.edu/dissertations_2/1011. Part of the Developmental Psychology Commons[14] Effect of Media Use on Adolescent Body Weight.by Eun Me Cha, MPH, PhD; Deanna M. Hoelscher, PhD Nalini Ranjit, PhD, Baojiang Chen, PhD; Kelley Pettee Gabriel, MS, PhD, Steven Kelder, MPH, PhD, ; Debra L. Saxton, MS was retrieved from the CDC – public domain

20. Effect of Media Use on Adolescent Body Weight.by Eun Me Cha, MPH, PhD; Deanna M. Hoelscher, PhD Nalini Ranjit, PhD, Baojiang Chen, PhD; Kelley Pettee Gabriel, MS, PhD, Steven Kelder, MPH, PhD, ; Debra L. Saxton, MS was retrieved from the CDC – public domain

active. TV commercials and other screen ads can lead to unhealthy food choices. Most of the time, the foods in ads that are aimed at kids are high in sugar, salt, or fats. Children eat more when they are watching TV, especially if they see ads for food. [21]

Several studies have shown that increased media use is associated with shorter and poorer quality sleep, which is also a significant risk factor for obesity. After-school screen time is associated with the increased size of evening snack portions and overall poor diet quality in adolescents. Moreover, epidemiologic studies have reported that consuming most daily calories in the evening is associated with a higher body mass index (BMI) and an increased risk of obesity and metabolic syndrome. Taken together, long-term media use is associated with negative effects on a variety of adolescent health behaviors, including unhealthy eating at night and inadequate sleep. Therefore, it is crucial to evaluate interventions that focus on decreasing adolescents' media use to prevent overweight and obesity, and other related chronic health conditions. [22]

Strategies to decrease media use can include parents setting limits on media use. The American Academy of Pediatrics (AAP) recommends that children watch no more than 1 to 2 hours of "quality programming" per day and that televisions be removed from children's bedrooms. [23] Parents are also encouraged to have their

21. Screen Time and Children from retrieved from MedlinePlus U.S. National Library of Medicine – Public domain
22. Effect of Media Use on Adolescent Body Weight.by Eun Me Cha, MPH, PhD; Deanna M. Hoelscher, PhD Nalini Ranjit, PhD, Baojiang Chen, PhD; Kelley Pettee Gabriel, MS, PhD, Steven Kelder, MPH, PhD, ; Debra L. Saxton, MS was retrieved from the CDC – public domain
23. Television and Video Viewing Time Among Children Aged 2 Years --- Oregon, 2006--2007 retrieved from the CDC – public domain

children exercise at least 60 minutes each day, as per CDC guidelines. [24]

Behavioral Influences

Studies have reported that young children who have two or more hours per day using mobile devices show more externalizing behaviors (aggression, tantrums) and inattention (Tamana, et al., 2019) and a higher risk of behavioral problems (Wu, 2017). What mechanism could be responsible for those behavioral outcomes? This was a question that Al Bandura sought to address. [25]

Albert Bandura (1977 developed **social-learning theory** which is learning by watching others. His theory calls our attention to the ways in which many of our actions are not learned through operant conditioning, as suggested by Skinner. Young children frequently learn behaviors through imitation. Especially when children do not know what else to do, they learn by modeling or copying the behavior of others. [26]

A series of studies by Al Bandura (et als. 1963) looked at the impact of television, particularly commercials, on the behavior of children. Are children more likely to act out aggressively when they see this behavior modeled? What if they see it being reinforced? Bandura began by conducting an experiment in which he showed children

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a film of a woman hitting an inflatable clown or "bobo" doll. Then the children were allowed in the room where they found the doll and immediately began to hit it. This was without any reinforcement whatsoever. Not only that, but they found new ways to behave aggressively. It's as if they learned an aggressive role. [27]

If children learn behavior by observation, what does the research say about witnessing media violence? Some studies suggest that violent television shows, movies, and video games may also have antisocial effects although further research needs to be done to understand the correlational and causational aspects of media violence and behavior. Some studies have found a link between viewing violence and aggression seen in children (Anderson & Gentile, 2008; Kirsch, 2010; Miller, Grabell, Thomas, Bermann, & Graham-Bermann, 2012). These findings may not be surprising, given that a child graduating from high school has been exposed to around 200,000 violent acts including murder, robbery, torture, bombings, beatings, and rape through various forms of media (Huston et al., 1992). Not only might viewing media violence affect aggressive behavior by teaching people to act that way in real-life situations but it has also been suggested that repeated exposure to violent acts also desensitizes people to it. Psychologists are working to understand this dynamic. [28]

However, many children watch violent media and do not become violent. Research has found that, just as children learn to be aggressive through observational learning, they can also learn prosocial behaviors in the same way (Seymour, Yoshida, & Dolan, 2009). Simple exposure to a model is not enough to explain

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observational learning. A variety of factors have been shown to explain the likelihood that exposure will lead to learning and modeling. Similarity, proximity, frequency of exposure, reinforcement, and likeability of the model are all related to learning. In addition, people can choose what to watch and whom to imitate. Observational learning is dependent on many factors, so people are well advised to select models carefully, both for themselves and their children.[29]

Media and Self-Understanding

Young children begin developing social understanding very early in life. While children of early, middle, and late development include other peoples' appraisals of them in their self-concept, they also receive messages from the media about how they should look and act. Movies, music videos, the internet, and advertisers can all create cultural images of what is desirable or undesirable and this too can influence a child's self-concept.[30]

When children internalize and compare themselves to these cultural images, it can affect their **self-esteem,** which is defined as an evaluation of one's identity. If there is a discrepancy between how children view themselves and what they consider to be their ideal selves, their self-esteem can be negatively affected.[31]

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For example, social media can have diverse effects on self-esteem. Think about Facebook or Twitter. Perhaps you know somebody who constantly posts about themselves in order for others to press like, which makes them feel validated and appreciated. However, if somebody doesn't respond in the way that they hope for, they might start to feel anxious and even a bit paranoid.[32]

Recess and Physical Education

Recess

Recess is a time for free play and Physical Education (PE) is a structured program that teaches skills, rules, and games. They're a big part of physical fitness for school-age children. For many children, PE and recess are the key components in introducing children to sports. After years of schools cutting back on recess and PE programs, there has been a turnaround, prompted by concerns over childhood obesity and related health issues. Despite these changes, currently, only the state of Oregon and the District of Columbia meet PE guidelines of a minimum of 150 minutes per week of physical activity in elementary school and 225 minutes in middle school (SPARC, 2016).

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Organized Sports: Pros and Cons

Middle childhood seems to be a great time to introduce children to organized sports, and in fact, many parents do. Nearly 3 million children play soccer in the United States (United States Youth Soccer, 2012). This activity promises to help children build social skills, improve athletically and learn a sense of competition. However, the emphasis on competition and athletic skill can be counterproductive and lead children to grow tired of the game and want to quit. In many respects, it appears that children's activities are no longer children's activities once adults become involved and approach the games as adults rather than children. The U. S. Soccer Federation recently advised coaches to reduce the amount of drilling engaged in during practice and to allow children to play more freely and choose their own positions. The hope is that this will build on their love of the game and foster their natural talents.

Sports are important for children. Children's participation in sports has been linked to:

- Higher levels of satisfaction with family and overall quality of life in children
- Improved physical and emotional development
- Better academic performance

Yet, a study on children's sports in the United States (Sabo & Veliz, 2008) has found that gender, poverty, location, ethnicity, and disability can limit opportunities to engage in sports. Girls were more likely to have never participated in any type of sport.

This study also found that fathers may not be providing their daughters as much support as they do their sons. While boys rated their fathers as their biggest mentors who taught them the most about sports, girls rated coaches and physical education teachers as their key mentors. Sabo and Veliz also found that children in suburban neighborhoods had much higher participation in sports than boys and girls living in rural or urban centers. In addition,

Caucasian girls and boys participated in organized sports at higher rates than minority children. With a renewed focus, males and females can benefit from all sports and physical activity.

The recent Sport Policy and Research Collaborative (2016) report on the "State of Play" in the United States highOrganizelights a disturbing trend. One in four children between the ages of 5 and 16 rate playing computer games with their friends as a form of exercise. In addition, **e-sports**, which as SPARC writes is about as much a sport as poker, involves children watching other children play video games. Over half of males, and about 20% of females, aged 12-19, say they are fans of e-sports. Play is an important part of childhood and physical activity has been proven to help children develop and grow. Adults and caregivers should look at what children are doing within their day to prioritize the activities that should be focused on.[33]

Stress and Coping

The term **stress** as it relates to the human condition first emerged in the scientific literature in the 1930s, but it did not enter the popular vernacular until the 1970s (Lyon, 2012). Today, we often use the term loosely in describing a variety of unpleasant feeling states; for example, we often say we are stressed out when we feel frustrated, angry, conflicted, overwhelmed, or fatigued. Despite the widespread use of the term, stress is a fairly vague concept that is difficult to define with precision.

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Researchers have had a difficult time agreeing on an acceptable definition of stress. Some have conceptualized stress as a demanding or threatening event or situation (e.g., a high-stress job, overcrowding, and long commutes to work). Such conceptualizations are known as stimulus-based definitions because they characterize stress as a stimulus that causes certain reactions. Stimulus-based definitions of stress are problematic, however, because they fail to recognize that people differ in how they view and react to challenging life events and situations. For example, a conscientious student who has studied diligently all semester would likely experience less stress during final exam week than would a less responsible, unprepared student.

Others have conceptualized stress in ways that emphasize the physiological responses that occur when faced with demanding or threatening situations (e.g., increased arousal). These conceptualizations are referred to as response-based definitions because they describe stress as a response to environmental conditions. For example, the endocrinologist Hans Selye, a famous stress researcher, once defined stress as the "response of the body to any demand, whether it is caused by, or results in, pleasant or unpleasant conditions" (Selye, 1976, p. 74). Selye's definition of stress is response-based in that it conceptualizes stress chiefly in terms of the body's physiological reaction to any demand that is placed on it. Neither stimulus-based nor response-based definitions provide a complete definition of stress. Many of the physiological reactions that occur when faced with demanding situations (e.g., accelerated heart rate) can also occur in response to things that most people would not consider to be genuinely stressful, such as receiving unanticipated good news: an unexpected promotion or raise.

The stress response, as noted earlier, consists of a coordinated but complex system of physiological reactions that are called upon as needed. These reactions are beneficial at times because they prepare us to deal with potentially dangerous or threatening situations (for example, recall our old friend, the fearsome bear on

the trail). However, health is affected when physiological reactions are sustained, as can happen in response to ongoing stress.

If the reactions that compose the stress response are chronic or if they frequently exceed normal ranges, they can lead to cumulative wear and tear on the body, in much the same way that running your air conditioner on full blast all summer will eventually cause wear and tear on it. For example, the high blood pressure that a person under considerable job strain experiences might eventually take a toll on his heart and set the stage for a heart attack or heart failure. Also, someone exposed to high levels of the stress hormone cortisol might become vulnerable to infection or disease because of weakened immune system functioning (McEwen, 1998).[34]

Stress on Young Children

Children experience different types of stressors. Normal, everyday stress can provide an opportunity for young children to build coping skills and poses little risk to development. Even more, long-lasting stressful events, such as changing schools or losing a loved one, can be managed fairly well. Children who experience toxic stress or who live in extremely stressful situations of abuse over long periods of time can suffer long-lasting effects. The structures in the midbrain or limbic systems, such as the hippocampus and amygdala, can be vulnerable to prolonged stress during early childhood (Middlebrooks & Audage, 2008). High levels of the stress hormone cortisol can reduce the size of the hippocampus and affect the child's memory abilities. Stress hormones can also reduce immunity to disease. The brain exposed to long periods of severe stress can

34. Psychology - What is Stress? by Openstax is licensed under CC-BY-4. 0 (modified by Marie Parnes)

develop a low threshold making the child hypersensitive to stress in the future.

Adverse Childhood Experiences (ACEs)

The toxic stress that young children endure can have a significant impact on their later lives. According to Merrick, Ford, Ports, and Guinn (2018), the foundation for lifelong health and well-being is created in childhood, as positive experiences strengthen biological systems while adverse experiences can increase mortality and morbidity. *All types of abuse, neglect, and other potentially traumatic experiences that occur before the age of 18* are referred to as **adverse childhood experiences (ACEs)** (CDC, 2019). ACEs have been linked to risky behaviors, chronic health conditions, low life potential, and early death, and as the number of ACEs increases, so does the risk for these results.[35]

Early Adversity has Lasting Impacts

35. Lifespan Development: A Psychological Perspective 2nd Edition by Martha Lally and Suzanne Valentine-French is licensed under CC BY-NC-SA 3.0

When a child experiences strong, frequent, and/or prolonged adversity without adequate adult support, the child's stress response systems can be activated and disrupt the development of the brain and other organ systems (Harvard University, 2019). Further, ACEs can increase the risk for stress-related disease and cognitive impairment, well into the adult years. Felitti et al. (1998) found that those who had experienced four or more ACEs compared to those who had experienced none, had increased health risks for alcoholism, drug abuse, depression, suicide attempt, increase in smoking, poor self-rated health, more sexually transmitted diseases, an increase in physical inactivity and severe obesity. More ACEs showed an increased relationship to the presence of adult diseases including heart disease, cancer, chronic lung disease, skeletal fractures, and liver disease. Overall, those with multiple ACEs were likely to have multiple health risk factors later in life.[37]

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Death

Early Death

Disease, Disability and social problems

Adoption of Health-risk Behaviors

Social, Emotional, & Cognitive Impairment

Adverse Childhood Experiences

Birth

How ACES affect children and adults [38]

Some groups have been found to be at a greater risk for experiencing ACEs. Merrick et al. (2018) reviewed the results from the 2011-2014 **Behavioral Risk Factor Surveillance System**, which included an ACE module consisting of questions adapted from the Centers for Disease Control and Prevention. Each question was collapsed into one of the eight ACE categories: physical abuse, emotional abuse, sexual abuse, household mental illness, household substance use, household domestic violence, incarcerated household member, and parental separation or divorce. The results

38. Image retrieved from Lifespan Development: A Psychological Perspective 2nd Edition by Martha Lally and Suzanne Valentine-French is licensed under CC BY-NC-SA 3.0

indicated that 25% of the sample had been exposed to three or more ACEs, and although ACEs were found across all demographic groups, those who identified as Black, multiracial, lesbian/gay/bisexual, having less than high school education, being low income, and unemployed experienced significantly higher ACE exposure. Assisting families and providing children with supportive and responsive adults can help prevent the negative effects of ACEs.

Separating Families at the United States Border

Thousands of children were separated from their parents beginning in April 2018 as they approached the United States border by Immigration and Customs Enforcement (ICE). Children were placed in separate facilities from their parents when they were being processed, and they were not told when they would be reunited. When enduring stressful situations, separation from one's parents can be extremely detrimental to a child (Society for Research in Child Development (SRCD), 2018). Parental separations affect children's stress management systems by changing how the body responds to stress. Long-term stress can disrupt brain functioning, cognitive skills, emotional processing, and physiological health. When exposed to stress, children typically look to their parents for support and care, and parents can reduce children's stress. These separated children were already under extreme stress escaping their previous homes and then were separated from the individuals who could support them through this process.

Stress from parent separation places children at a higher risk for anxiety, depression, PTSD, lower IQ, obesity, impaired immune system functioning, and medical conditions (SRCD, 2018). Even after being reunited, children can experience attachment issues, poorer self-esteem, and physical and psychological health difficulties. As they age, they continue to exhibit an increased risk for mental health problems, problems in social interactions, difficulty with

adult attachments, poorer stress management, and an increased risk for death. The American Psychological Association (2019) opposes policies that separate families given the negative outcomes suffered by children. [39]

Resiliency

Being able to overcome challenges and successfully adapt is **resiliency.** Even young children can exhibit strong resilience to harsh circumstances. [40] However, we can't "make" children resilient, but we can explore those qualities and skills that help them develop key elements of resiliency. Ann Masten, one of the foremost researchers of resilience in children, writes, "Resilience does not come from rare and special qualities, but from the everyday magic of ordinary, normative human resources in the minds, brains, and bodies of children, in their families and relationships, and in their communities." This "ordinary magic" means that children will be more able to adapt to adversity and threats when their basic human systems are nurtured and supported.

Factors that Contribute to Childhood Resilience

While many factors contribute to resilience, three stand out:

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cognitive development, self-regulation, and relationships with caring adults.

Cognitive Development/Problem-solving Skills

As a species, we have been solving problems since the beginning of time. Watch a child play and you will see that his/her problem-solving skills are nearly always at work. Infants attempt to soothe themselves by figuring out how to put their thumbs in their mouths or crying for a caregiver. Toddlers try to fit shapes into shape sorters. As children mature, the problems they solve get more complex. Solving problems engages our prefrontal cortex, sometimes called the "thinking brain," which is the seat of our executive function. During times of stress and trauma, this part of our brain is typically shut down so that our body can respond to the threats it is facing. By helping children engage in problem-solving activities, they not only gain a sense of self-efficacy and mastery, they also re-engage the parts of their brain that may have been offline. Because the neural pathways of young brains are still being wired, the more we can engage and reinforce healthy pathways, the better. Developing problem-solving skills also helps children with self-regulation skills, another key quality that fosters resilience.

Self-regulation

Self-regulation is the ability to control oneself in a variety of ways. Infants develop regular sleep-wake patterns. Schoolchildren learn to raise their hands and wait patiently to be called on rather than shouting out an answer. College students concentrate for hours on a research paper, delaying the gratification that might come with being outdoors on a sunny day. Self-regulation has been identified as "the cornerstone" of child development. In the seminal publication From Neurons to Neighborhoods, experts conclude,

"Development may be viewed as an increased capacity for self-regulation, seen particularly in the child's ability to function more independently in a personal and social context." It involves working memory, the ability to focus on a goal, tolerance for frustration, and controlling and expressing one's emotions appropriately and in context. Self-regulation is key for academic and social success and plays a significant role in mental health outcomes—all things that can be a challenge for children experiencing homelessness and other stressors.

Relationships with Caring Adults

Ideally, we form close attachment relationships with our primary caregiver(s) beginning at birth. As we get older, those relationships extend to teachers, neighbors, family, friends, coaches, and others. Disrupted attachment relationships can be devastating for young children because they are still developing an internal working model of what relationships look like and because they rely so intensively on their caregivers to get their basic needs met. By developing relationships with caring adults, whether they be parents, family members, coaches, teachers, or neighbors, children learn about healthy relationships—ones that are consistent, predictable, and safe. They receive guidance, comfort, and mentoring.[41]

41. Childhood Resilience retrieved from SAMSA HHS.gov – public domain

Immunization and Chronic Health Conditions

Protecting Health through Immunization

One way we can protect a child's health (and those around them) is through **immunization**. The vaccines (given through injection) may hurt a little...but the diseases they can prevent can hurt a lot more! Immunization shots, or vaccinations, are essential. They protect against things like measles, mumps, rubella, hepatitis B, polio, diphtheria, tetanus and pertussis (whooping cough). Immunizations are important for adults as well as for children. Here's why.

The immune system helps the human body fight germs by producing substances to combat them. Once it does, the immune system "remembers" the germ and can fight it again. Vaccines contain germs that have been killed or weakened. When given to a healthy person, the vaccine triggers the immune system to respond and thus build immunity. Before vaccines, people became immune only by actually getting a disease and surviving it. Immunizations are an easier and less risky way to become immune.

While vaccines begin in infancy, it is important for children to receive additional doses of vaccines to keep them protected. These boosters, given between ages 4 and 6, are doses of the vaccines they received earlier in life to help them maintain the best protection against vaccine-preventable diseases.

Many states require children to be fully vaccinated (unless they have a medical reason to be exempt) before they can enroll in licensed child care or public school. If vaccinations were missed, a health care provider can help the child's caregivers to create a catch-up schedule to ensure the child correctly "catches up" with the recommended childhood vaccination schedule.

Vaccines are the best defense we have against serious, preventable and sometimes deadly contagious diseases. Vaccines are some of the safest medical products available, but like any other medical product, there may be risks. Accurate information about the value of vaccines as well as their possible side effects helps people to make informed decisions about vaccination.

Potential Side Effects

Vaccines, like all medical products, may cause side effects in some people. Most of these side effects are minor, such as redness or swelling at the injection site. Any vaccine can cause side effects. For the most part, these are minor (for example, a sore arm or low-grade fever) and go away within a few days. Serious side effects after vaccination, such as severe allergic reactions, are very rare. Remember, vaccines are continually monitored for safety, and like any medication, vaccines can cause side effects. However, a decision not to immunize a child also involves risk and could put the child and others who come into contact with him or her at risk of contracting a potentially deadly disease.

How Well Do Vaccines Work?

Vaccines work really well. No medicine is perfect, of course, but most childhood vaccines produce immunity about 90–100% of the time.What about the argument made by some people that vaccines don't work that well; that diseases would be going away on their own because of better hygiene or sanitation, even if there were no vaccines? That simply isn't true. Certainly better hygiene and sanitation can help prevent the spread of disease, but the germs that

cause disease will still be around, and as long as they are they will continue to make people sick.

All vaccines must be licensed (approved) by the Food and Drug Administration (FDA) before being used in the United States, and a vaccine must go through extensive testing to show that it works and that it is safe before the FDA will approve it. Among these tests are clinical trials, which compare groups of people who get a vaccine with groups of people who get a control. A vaccine is approved only if FDA makes the determination that it is safe and effective for its intended use.

If you look at the history of any vaccine-preventable disease, you will virtually always see that the number of cases of disease starts to drop when a vaccine is licensed. Vaccines are the most effective tool we have to prevent infectious diseases.

Opposition to Vaccines

In 2010, a pertussis (whooping cough) outbreak in California sickened 9,143 people and resulted in 10 infant deaths: the worst outbreak in 63 years (Centers for Disease Control 2011b). Researchers, suspecting that the primary cause of the outbreak was the waning strength of pertussis vaccines in older children, recommended a booster vaccination for 11–12-year-olds and also for pregnant women (Zacharyczuk 2011). Pertussis is most serious for babies; one in five needs to be hospitalized, and since they are too young for the vaccine themselves, it is crucial that people around them be immunized (Centers for Disease Control 2011b). Several states, including California, have been requiring the pertussis booster for older children in recent years with the hope of staving off another outbreak.

But what about people who do not want their children to have this vaccine or any other? That question is at the heart of a debate that

has been simmering for years. Vaccines are biological preparations that improve immunity against a certain disease. Vaccines have contributed to the eradication and weakening of numerous infectious diseases, including smallpox, polio, mumps, chicken pox, and meningitis.[42]

These children contracted polio [43]

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However, many people express concern about the potential negative side effects of vaccines. These concerns range from fears about overloading the child's immune system to controversial reports about the devastating side effects of the vaccines.

Although children continue to get several vaccines up to their second birthday, these vaccines do not overload the immune system. Every day, an infant's healthy immune system successfully fights off thousands of antigens – the parts of germs that cause their immune system to respond. Even if your child receives several vaccines in one day, vaccines contain only a tiny amount of antigens compared to the antigens your baby encounters every day. This is the case even if your child receives combination vaccines. Combination vaccines take two or more vaccines that could be given individually and put into one shot. Children get the same protection as they do from individual vaccines given separately—but with fewer shots.

One misapprehension is that the vaccine itself might cause the disease it is supposed to be immunized against. Vaccines help develop immunity by imitating an infection, but this "imitation" infection does not cause illness. Instead, it causes the immune system to develop the same response as it does to a real infection so the body can recognize and fight the vaccine-preventable disease in the future. Sometimes, after getting a vaccine, the imitation infection can cause minor symptoms, such as fever. Such minor symptoms are normal and should be expected as the body builds immunity.

Another commonly circulated concern is that vaccinations, specifically the MMR vaccine (MMR stands for measles, mumps, and rubella), are linked to autism. The autism connection has been particularly controversial. In 1998, a British physician named Andrew Wakefield published a study in Great Britain's Lancet magazine that linked the MMR vaccine to autism. The report received a lot of media attention, resulting in British immunization

rates decreasing from 91 percent in 1997 to almost 80 percent by 2003, accompanied by a subsequent rise in measles cases (Devlin 2008). A prolonged investigation by the British Medical Journal proved that not only was the link in the study nonexistent but that Dr. Wakefield had falsified data in order to support his claims (CNN 2011). Dr. Wakefield was discredited and stripped of his license, but the doubt still lingers in many parents' minds.

In the United States, many parents still believe in the now-discredited MMR-autism link and refuse to vaccinate their children. Other parents choose not to vaccinate for various reasons like religious or health beliefs. In one instance, a boy whose parents opted not to vaccinate returned home to the U.S. after a trip abroad; no one yet knew he was infected with measles. The boy exposed 839 people to the disease and caused 11 additional cases of measles, all in other unvaccinated children, including one infant who had to be hospitalized. According to a study published in Pediatrics (2010), the outbreak cost the public sector $10,376 per diagnosed case. The study further showed that the intentional non-vaccination of those infected occurred in students from private schools, public charter schools, and public schools in upper-socioeconomic areas (Sugerman et al. 2010).

Chronic Health Conditions in Childhood

About 25% of children in the United States aged 2 to 8 years have a chronic health condition such as asthma, obesity, other physical conditions, and behavior/learning problems. The healthcare needs of children with chronic illness can be complex and continuous and include both daily management and addressing potential emergencies. Asthma and Diabetes are examples of two health conditions in childhood that require careful management both inside and outside of the home.

Asthma

Asthma is a chronic disease that affects your airways. Your airways are tubes that carry air in and out of your lungs. If you have asthma, the inside walls of your airways become sore and swollen.

In the United States, about 20 million people have asthma. Nearly 9 million of them are children. Children have smaller airways than adults, which makes asthma especially serious for them. Children with asthma may experience wheezing, coughing, chest tightness, and trouble breathing, especially early in the morning or at night.

Many things can cause asthma including allergens, irritants, weather, exercise, and infections. When asthma symptoms become worse than usual, it is called an asthma attack. Asthma is treated with two kinds of medicines: quick-relief medicines to stop asthma symptoms and long-term control medicines to prevent symptoms.

Asthma Triggers

Diabetes

Until recently, the common type of diabetes in children and teens was type 1. It was called juvenile diabetes. With Type 1 diabetes, the pancreas does not make insulin. Insulin is a hormone that helps glucose, or sugar, get into your cells to give them energy. Without insulin, too much sugar stays in the blood.

Now younger people are also getting type 2 diabetes. Type 2 diabetes used to be called adult-onset diabetes. But now it is becoming more common in children and teens, due to more obesity. With Type 2 diabetes, the body does not make or use insulin well.

Children have a higher risk of type 2 diabetes if they are overweight or have obesity, have a family history of diabetes, or are not active. Children who are African American, Hispanic, Native American/Alaska Native, Asian American, or Pacific Islander also have a higher risk. To lower the risk of type 2 diabetes in children:

- Have them maintain a healthy weight
- Be sure they are physically active
- Have them eat smaller portions of healthy foods
- Limit time with the TV, computer, and video

44. Asthma Triggers by 7Mike5000 retrieved from Wikipedia Commons is licensed under CC SA-3.

Children and teens with type 1 diabetes may need to take insulin. Type 2 diabetes may be controlled with diet and exercise. If not, patients will need to take oral diabetes medicines or insulin. A blood test called the A1C can check on how you are managing your diabetes.[45]

Child Mental Health Disorders

Consequences of Mental Illness

The consequences of **mental illness** in children and adolescents can be substantial. Many mental health professionals speak of accrued deficits that occur when mental illness in children is not treated. To begin with, mental illness can impair a student's ability to learn. Adolescents whose mental illness is not treated rapidly and aggressively tend to fall further and further behind in school. They are more likely to drop out of school and are less likely to be fully functional members of society when they reach adulthood. Many of these mental and behavioral disorders have been discussed in previous chapters.

We also now know that **depressive disorders** in young people confer a higher risk for illness and interpersonal and psychosocial difficulties that persist after the depressive episode is over. Furthermore, many adults who suffer from mental disorders have problems that originated in childhood. Depression in youth may predict more severe illness in adult life. **Attention deficit hyperactivity disorder**, once thought to affect children and adolescents only, may persist into adulthood and may be associated

45. Diabetes in Children and Teens retrieved from MedlinePlus **U.S. National Library of Medicine** – Public domain

with social, legal, and occupational problems. Mental illness impairs a student's ability to learn.[46]
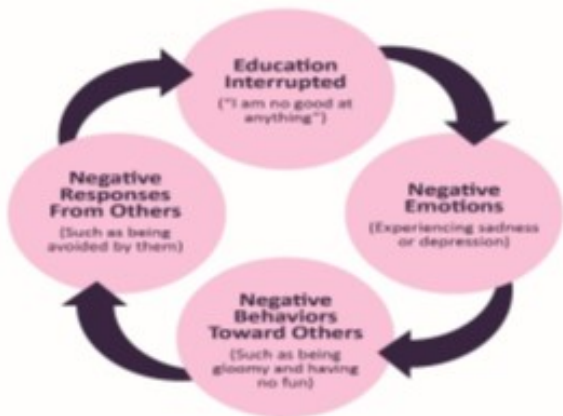
The cycle of Depression: Negative emotions create negative behaviors, which lead people to respond negatively to the individual, creating even more depression.

Access to mental health treatment

Early diagnosis and appropriate services for children and their

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families can make a difference in the lives of children with mental disorders. Access to providers who can offer services, including screening, referrals, and treatment, varies by location. CDC is working to learn more about access to behavioral health services and supports for children and their families.[47]

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47. Data and Statistics on Children's Mental Health from the CDC is public domain

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