# Chapter 3: Physical and Cognitive Development in Infancy

## Physical Growth and Development in Infancy

At birth, an infant has few of the physical abilities we associate with being human.
The newborn's head, which is huge relative to the rest of the body, flops around uncontrollably.
Apart from some basic reflexes and the ability to cry, the newborn is unable to perform many actions.
Over the next 12 months, however, the infant becomes capable of sitting, standing, stooping, climbing, and usually walking.
During the second year, while growth slows, rapid increases in activities such as running and climbing take place.

### Patterns of Growth

Two words characterize growth during prenatal development and early infancy.
In the cephalocaudal pattern, cephalocaudal means head- (cephalo) to-tail (caudal).
This growth pattern explains why the head occupies an extraordinary proportion of the newborn's body
Physical growth and differentiation of features gradually work their way down from top to bottom (shoulders, middle trunk, and so on).
This same pattern occurs within the head area, as the top parts of the head—the eyes and brain—grow faster than the lower parts, such as the jaw.
Infants see objects before they can control their torso, and they can use their hands long before they can crawl or walk.
In the proximodistal pattern, proximodistal means near-to-far, and the pattern refers to a sequence in which growth starts at the centre of the body and moves toward the extremities.

For example, infants control the muscles of their trunk and arms before they control their hands, and they use their whole hands before they can control their fingers

## The Brain

Researchers in the field of developmental cognitive neuroscience explore how the brain develops and how developmental changes in neural activity affect (and are affected by) cognitive development.

### The Brain's Development

At birth, the infant that began as a single cell has a brain that contains tens of billions of nerve cells, or neurons.
At birth, the brain weighs about 25 percent of its adult weight.
Extensive brain development continues after birth, through infancy, and later
By the second birthday, the brain is about 75 percent of its adult weight.
Because the brain is developing so rapidly in infancy, the infant's head should be protected from falls or other injuries and the baby should never be shaken.
But the baby's brain does not simply get larger.
Through interactions with the environment, individual neurons and the connections among them are shaped, allowing perception, language, and complex thought.

### Changes in Neurons and the Connections among Them

Within the brain, neurons send electrical and chemical signals, communicating with each other.
A neuron is a nerve cell that handles information processing
Extending from the neuron's cell body are two types of fibres, known as axons and dendrites.
Generally, the axon carries signals away from the cell body, and dendrites carry signals toward it.
A myelin sheath, which is a layer of fat cells, encases many axons
The myelin sheath provides insulation and helps electrical signals travel faster down the axon
Myelination is also involved in providing energy to neurons and in facilitating communication

At the end of the axon are terminal buttons, which release chemicals called neurotransmitters into synapses, tiny gaps between neurons.
Chemical interactions in synapses connect axons and dendrites, allowing information to pass from one neuron to another
Neurons change in two very significant ways during the first years of life.
First, myelination, the process of encasing axons with fat cells, begins prenatally and continues throughout childhood, even into adolescence
Second, connectivity among neurons increases, creating new neural pathways.
New dendrites grow, connections among dendrites increase, and synaptic connections between axons and dendrites proliferate.
Whereas myelination speeds up neural transmissions, the expansion of dendritic connections facilitates the spreading of neural pathways in infant development.

## The Timing of Neuronal Growth Varies across Regions

In the prefrontal cortex, the area of the brain where higher-level thinking and self-regulation occur, the peak of overproduction occurs at just over 3 years of age; it is not until middle to late adolescence that the adult density of synapses is achieved
Both heredity and environment are thought to influence the timing and course of synaptic overproduction and subsequent retraction.
Meanwhile, the pace of myelination also varies in different areas of the brain
Myelination for visual pathways occurs rapidly after birth and is completed in the first 6 months. Auditory myelination is not completed until 4 or 5 years of age.

## Changes in Brain Structure

Scientists analyze and categorize areas of the brain in numerous ways
Of greatest interest is the portion farthest from the spinal cord, known as the forebrain, which includes the cerebral cortex and several structures beneath it
The cerebral cortex covers the forebrain like a wrinkled cap.
It has two halves, or hemispheres.
Based on ridges and valleys in the cortex, scientists distinguish four main areas, called lobes, in each hemisphere: the frontal lobes, the occipital lobes, the temporal lobes, and the parietal lobes

Although these areas are found in the cerebral cortex of each hemisphere, the two hemispheres are not identical in anatomy or function.

Lateralization is the specialization of function in one hemisphere or the other.

At birth, the hemispheres of the cerebral cortex have already started to specialize: newborns show greater electrical brain activity in the left hemisphere than in the right hemisphere when listening to speech sounds

Early specialization of the left hemisphere might reflect early auditory experience.

## Studying Brain Development

Assessing the infant's brain activity is not easy.

Positron-emission tomography (PET) scans pose a radiation risk to babies, and sometimes infants wriggle too much to allow the technician to capture accurate brain images with magnetic resonance imaging (MRI). However, researchers have been successful in using the electroencephalogram (EEG), a measure of the brain's electrical activity, to learn about the brain's development in infancy

Researchers are also increasingly studying infants' brain activity by using functional near-infrared spectroscopy (fNIRS), which uses very low levels of near-infrared light to monitor changes in blood oxygen

Unlike fMRI, which uses magnetic fields or electrical activity, fNIRS is portable and allows the infants to be assessed as they explore the world around them.

Developmental cognitive neuroscience is paving the way for helping babies who are at risk for various developmental abnormalities.

## Early Experience and the Brain

The infant's brain is literally waiting for experiences to determine how connections are made.

Before birth, it appears that genes mainly direct how the brain establishes basic wiring patterns; after birth, environmental experiences guide the brain's development.

The inflowing stream of sights, sounds, smells, touches, language, and eye contact helps shape neural connections

It may not surprise us, then, that depressed brain activity has been found in children who grow up in a deprived environment

Infants whose caregivers expose them to a variety of stimuli—talking, touching, playing are most likely to develop to their full potential.
This perspective is certainly consistent with Bronfenbrenner’s ecological theory
The profusion of neural connections described earlier provides the growing brain with flexibility and resilience

### The Neuroconstructivist View

From a single cell to tens of billions of neurons, brain development involves the growth and differentiation of neurons, the formation and loss of synapses, and the specialization of brain regions.
Not long ago, scientists thought that our genes determined how our brains were “wired” and that the cells in the brain responsible for processing information just maturationally unfolded with little or no input from environmental experiences.
Whatever brain your heredity dealt you, you were essentially stuck with it. This view, however, turned out to be wrong.
Instead, the brain has plasticity, and its development depends on context
The neuroconstructivist view is that biological processes and environmental experiences interact to influence the brain’s development.
The infant’s genotype, for example, interacts with the environment such that children who grow up in orphanages show depressed brain activity relative to children who grow up in healthy family environments
The neuroconstructivist view also claims that the development of the brain and the child’s cognitive development are closely linked.
Brain development influences or constrains children’s cognitive abilities, and children’s thinking (neural activity) influences brain development
The neuroconstructivist view aligns nicely with the epigenetic view. Both emphasize the important interplay of genes and the environment.

## Sleep

The typical newborn sleeps 16 to 17 hours a day, with considerable individual variation from one baby to the next.

For newborns, the range is from about 10 hours to about 21 hours per day, with most babies sleeping through the night by 6 months of age
Infants not only sleep more than adults, but they also spend a much greater amount of time in REM (rapid eye movement) sleep
Infants spend about half of their sleep time in REM sleep, and they often begin their sleep cycle with REM sleep rather than non-REM sleep.
In contrast, adults spend about one-fifth of their night in REM sleep and begin their sleep cycle with non-REM sleep.
By the time infants reach 3 months of age, the percentage of time they spend in REM sleep decreases to about 40 percent, and REM sleep no longer begins their sleep cycle

### Sleep and Cognitive Development

The large amount of REM sleep may provide infants with added self-stimulation, since they spend less time awake than do older children.
REM sleep might also promote the brain's development in infancy
A link between infant sleep and cognitive functioning during childhood is plausible given sleep's role in brain maturation and memory consolidation
Several findings suggest that babies with good sleep patterns have higher cognitive functioning during childhood.
Lower quality of sleep during infancy has been linked to lower attention regulation and more behaviour problems at 3 to 4 years of age and to emotional dysregulation at 2 to 3 years of age, which in turn has been related to poor attention functioning in elementary school

## Nutrition

From birth to 1 year of age, human infants nearly triple their weight and increase their length by 40 percent.

### Breastfeeding versus bottle-feeding

For the first 4 to 6 months of life, human milk or an alternative formula is the baby's source of nutrients and energy.
For years, debate has focused on whether breastfeeding is better for the infant than bottle-feeding.

The growing consensus is that breastfeeding is better for the baby's health
During the first 2 years of life and beyond, benefits include appropriate weight gain and reduced risk of child and adult obesity reduced risk of sudden infant death syndrome (SIDS) fewer gastrointestinal infections and fewer lower respiratory tract infections
Further, a study of more than 500,000 Scottish children found that those who were breastfed exclusively at 6 to 8 weeks of age were less likely to have ever been hospitalized through early childhood than their formula-fed counterparts

# Motor Development

## Reflexes

The newborn is not completely helpless. Although unable to walk or crawl, newborns are equipped with a range of reflexes, built-in reactions to stimuli that govern the newborn's movements.
Reflexes allow infants to respond adaptively to their environment before they have had the opportunity to learn.
Most reflexes have obvious adaptive value.
The rooting and sucking reflexes are essential for newborn mammals, who must find a mother's nipple to obtain nourishment.
The rooting reflex occurs when the infant's cheek is stroked or the side of the mouth is touched.
In response, the infant turns its head toward the side that was touched in an apparent effort to find something to suck.
The sucking reflex occurs when newborns automatically suck an object placed in their mouth.
This reflex enables newborns to get nourishment before they have associated a nipple with food.

## Dynamic Systems Theory

Developmentalist Arnold Gesell (1934) discovered that infants and children develop rolling, sitting, standing, and other motor skills in a fixed order and within specific time frames.
Gesell argued that motor development comes about through the unfolding of a genetic plan, emphasizing nature rather than nurture.

Gesell's observations were pains- taking (he did not have the technology available to researchers today), but we now know that the sequence of developmental milestones is not as fixed as he observed and that motor development does not reflect the simple unfolding of a genetic plan

More recent theories emphasize the function/ adaptive value of motor behaviour, a perspective that aligns with evolutionary theory.

A baby might learn to crawl when she sees an exciting new toy and is motivated to reach it.

This idea is formalized in dynamic systems theory. According to this theory, perception and action are coupled

In order to develop motor skills, infants must perceive something in the environment that motivates them to act and then use their perceptions to fine-tune their movements.

Motor skills thus represent pathways to the infant's goals

When infants are motivated to do something, they might create a new motor behaviour.

The new behaviour is the result of many converging factors: the development of the nervous system, the body's physical properties and its possibilities for movement, the goal the child is motivated to reach, and environmental support for the skill.

## Gross Motor Skills

Gross motor skills are skills that involve large-muscle activities, such as moving one's arms and walking.

Newborn infants cannot voluntarily control their posture.

Within a few weeks, though, they can hold their heads erect, and soon they can lift their heads while lying on their stomachs.

By 2 months of age, babies can sit while supported on a lap or an infant seat, but they cannot sit independently until they are 6 or 7 months of age.

Standing also develops gradually during the first year of life. By about 8 months of age, infants usually learn to pull themselves up and hold on to a chair, and by about 10 to 12 months of age they can often stand alone.

Learning to walk and crawl provides a host of learning opportunities. Many adults recall running down a hill as a child, only to discover the hill was too steep to navigate safely as they lost control of their legs. In

the same way, infants must learn what kinds of places and surfaces are safe for crawling or walking

Karen Adolph (1997) investigated how experienced and inexperienced crawling and walking infants go down steep slopes (see Figure 3.9).

Newly crawling infants, who averaged about 8 months of age, rather indiscriminately went down the steep slopes, often falling in the process (with their mothers standing next to the slope to catch them).

After weeks of practice, the crawling babies became more adept at judging which slopes were too steep to crawl down and which ones they could navigate safely.

Does that learning transfer to walking? You might expect that babies who learned that a slope was too steep for crawling would be able to select safe slopes when beginning to walk.

But Adolph’s research indicated that newly walking infants could not judge the safety of the slopes.

Only when infants became experienced walkers were they able to accurately match their skills with the steepness of the slopes.

Unlike novice walkers, experienced walkers rarely fell downhill, either refusing to go down the steep slopes or cautiously going down backward. Experienced walkers assessed the situation perceptually—looking, swaying, touching, and thinking before they moved down the slope.

With experience, both crawlers and walkers learned to avoid the risky slopes where they would fall, integrating perceptual information with the development of a new motor behaviour.

New motor skills require practice.

According to dynamic systems theory, action is motivated by perception. In the same way, action provides new opportunities for learning. Walking experience allows infants to come in contact with objects that were previously out of reach.

This is why houses need to be baby-proofed all over again when babies move from crawling to walking!

Increased mobility also allows babies to initiate interaction with parents and other adults, thereby promoting language development

The motor accomplishments of the first year bring increasing independence, allowing infants to explore their environment more extensively and to initiate interaction with others more readily.

In the second year of life, toddlers become more mobile as their motor skills are honed.

By 13 to 18 months, toddlers can pull a toy attached to a string and use their hands and legs to climb up steps.
By 18 to 24 months, toddlers can walk quickly or run stiffly for a short distance, balance on their feet in a squatting position while playing with objects on the floor, walk backward without losing their balance, stand and kick a ball without falling, stand and throw a ball, and jump in place.
Caring for a busy 18-month-old is fun, but demanding.
Motor activity during the second year is vital to the child's competent development, so experts recommend that few restrictions, except those having to do with safety, should be placed on their adventures

### Fine Motor Skills

Whereas gross motor skills involve large-muscle activity, fine motor skills involve finely tuned movements.
Grasping a toy, using a spoon, buttoning a shirt, or anything that requires finger dexterity demonstrates fine motor skills.
At birth, infants have very little control over fine motor skills, but they do have many components of what will become finely coordinated arm, hand, and finger movements
The onset of reaching and grasping marks a significant achievement in infants' ability to interact with their surroundings
During the first 2 years of life, infants refine how they reach and grasp.
Whereas young infants reach by swinging their entire arm toward an object, older infants reach more precisely.
Like walking and crawling, experience plays a role in reaching and grasping

## Sensory and Perceptual Development

Can newborns see? If so, what can they perceive? How do sensations and perceptions develop? Can infants put together information from two modalities, such as sight and sound? These are among the intriguing questions that we explore in this section.

## Exploring Sensory and Perceptual Development

How does a newborn know that their mother’s skin is soft rather than rough? How does a 5-year-old know what colour their hair is? Infants and children “know” these things as a result of information that comes through the senses.

Sensation occurs when information interacts with sensory receptors—the eyes, ears, tongue, nostrils, and skin.

The sensation of hearing occurs when waves of pulsating air are collected by the outer ear and transmitted through the bones of the inner ear to the auditory nerve.

The sensation of vision occurs as rays of light contact the eyes, become focused on the retina, and are transmitted by the optic nerve to the visual centres of the brain.

Perception is the interpretation of what is sensed.

The air waves that contact the ears might be interpreted as noise or as musical sounds, for example.

The physical energy transmitted to the retina of the eye might be interpreted as a particular colour, pattern, or shape, depending on how it is perceived.

Perception brings us into contact with the environment in order to interact with and adapt to it.

Perception is designed for action. It gives people information, such as when to duck, when to turn their bodies as they move through a narrow passageway, and when to put their hands up to catch something

### Studying the Infant's Perception

Studying the infant’s perception is not an easy task. Unlike most research participants, infants cannot write, type on a computer keyboard, or speak well enough to explain to an experimenter what their responses are to a given stimulus or condition.

Yet scientists have developed several ingenious research methods to examine infants’ sensory and perceptual development

### The Visual Preference Method

Robert Fantz (1963), a pioneer in this effort, made an important discovery: infants look at different things for different lengths of time.

Fantz placed infants in a looking chamber, which had two visual displays on the ceiling above the infant's head. An experimenter viewed the infant's eyes by looking through a peephole.
If the infant was gazing at one of the displays, the experimenter could see the display's reflection in the infant's eyes.
This allowed the experimenter to determine how long the infant looked at each display.
Fantz (1963) found that infants only 2 days old would gaze longer at patterned stimuli (such as faces or concentric circles) than at red, white, or yellow discs.
Similar results were found with infants 2 to 3 weeks old
Fantz's research method studying whether infants can distinguish one stimulus from another by measuring the length of time they attend to different stimuli—is referred to as the visual preference method.

**Habituation and Dishabituation**

There are two broad explanations when babies fail to show a visual preference.
One explanation is that they cannot discriminate between the two stimuli.
The other is that they do not prefer one stimulus over another, despite being able to tell them apart.
To measure discrimination, researchers use a habituation paradigm.
During the habituation (familiarization) phase, a stimulus (such as a sight or a sound) is presented a number of times until the infant decreases its response (e.g., looking times decrease).
Habituation indicates that the infant is no longer interested in the stimulus.
If the researcher now presents a new stimulus and the infant can discriminate it from the habituation stimulus, the infant's response will recover
The recovery of a habituated response after a change in stimulation is called dishabituation. If the baby does not show dishabituation, we conclude that they cannot tell the two stimuli apart.
As we will see later in this chapter, the habituation paradigm allows researchers not only to investigate basic abilities (such as discriminating shapes) but also to investigate more advanced cognitive abilities

### Eye Tracking

The most important more recent advance in measuring infant perception is the development of sophisticated eye-tracking equipment
Eye tracking consists of measuring eye movements that follow (track) a moving object and can be used to evaluate an infant’s early visual ability
One of the main reasons that infant perception researchers are so enthusiastic about the availability of sophisticated eye-tracking equipment is that looking time is among the most important measures of infant perceptual and cognitive development
The eye-tracking equipment allows for far greater precision in assessing various aspects of infant looking and gaze than is possible with human observation
Among the areas of infant perception in which eye-tracking equipment is being used are attention

## Visual Perception

Psychologist William James (1890/1950) called the newborn’s perceptual world a “blooming, buzzing confusion.” More than a century later, we can safely say that he was wrong

### Visual Acuity

Just how well can infants see? Using the visual preference method, the newborn’s vision is estimated to be 20/600 on the well-known Snellen eye examination chart
This means that a newborn can clearly see from 20 feet (6 m) what an adult with normal (20/20) vision can clearly see from a distance of 600 feet (180 m).
Visual acuity improves rapidly during the first year of life.
By 6 months of age, an average infant’s vision is 20/40
This means that babies perceive a blurry world, just like adults with abnormal vision when not wearing glasses or contact lenses.

### Depth Perception

As infants become mobile, there is clear adaptive value to perceiving depth.

Babies must avoid crawling or walking over edges. Investigating when babies perceive depth is tricky.
Researchers certainly don't want babies to fall over an edge to provide evidence that depth perception has yet to develop!
In a seminal study, Eleanor Gibson and Richard Walk (1960) constructed a visual cliff.
They did this by creating two levels of a checkerboard pattern—one at the height of the table and the other at floor level.
The drop-off was covered by glass so that it was safe for babies to crawl over the visual cliff.
They placed 6- to 12-month-old infants on the edge of this visual cliff and had their mothers coax them to crawl onto the glass
Most infants would not crawl out on the glass, choosing instead to remain on the "safe" side, an indication that they could perceive depth.

## Other Senses

Other sensory systems besides vision also develop during infancy, including hearing, touch and pain, smell, and taste. It is beyond the scope of this book to look at all of these in detail, but let's take a brief look at hearing.
Researchers and parents are keen to understand the development of hearing during infancy.
After all, it plays a key role in language development, a process that begins prenatally

### Hearing

Whereas visual experience begins at birth, auditory experience begins during the last 2 months of pregnancy.
As the fetus nestles in the womb, it can hear sounds such as the mother-to-be's voice
The researchers then used operant conditioning to determine whether the newborns recognized their own mother's voice
If babies increased the duration of their pauses, they got to hear their mother's voice; if they decreased the duration of their pauses, they heard the voice of another new mother.

Newborns altered their sucking pattern to produce their own mother’s voice more often than that of the unfamiliar woman, suggesting that they recognized and preferred their mother’s voice.

## Intermodal Perception

There is good correspondence between much of the visual and auditory information:
When you see the ball bounce, you hear a bouncing sound; when a player stretches to hit or throw a ball, you hear a groan. When you look at and listen to what is going on, you do not experience just the sounds or just the sights; you put all these things together.
You experience a unitary episode. This is intermodal perception, which involves integrating information from two or more sensory modalities, such as vision and hearing
Dishabituation was observed when the rhythm changed—but only when infants could see and hear the rhythm.
Babies did not show dishabituation after watching a silent hammer or hearing an “invisible” hamer, providing evidence that they had not learned about rhythm.
More recent work has shown that 5-month-olds can also match the facial expressions and vocalizations of other babies; infants showed preferential looking toward the facial expression that matched the parents who want to foster vocalization
There is a lot of redundant musical skills in their information in the world, and this redundancy plays an important role in facilitating perceptual and cognitive development during infancy

## The Nature, Nurture, and Perceptual Development from Fetus to Newborn

Now that we have discussed many aspects of perceptual development, let’s explore one of developmental psychology’s key issues as it relates to perceptual development: the nature-nurture issue.
There has been a longstanding interest in how strongly infants’ perception is influenced by nature or nurture
In the field of perceptual development, those who emphasize nature are referred to as nativists and those who emphasize learning and experience are called empiricists.

## Visual Acuity after Visual Deprivation

Daphne Maurer and her colleagues at McMaster University have conducted longitudinal research with infants born with cataracts—a thickening of the lens of the eye that causes vision to become cloudy and opaque and blocks visual input from reaching the retina.
After the cataracts are removed, babies are given contact lenses.
In one study (Maurer, Lewis, Brent, & Levin, 1999), the researchers tested patients' visual acuity immediately after the contact lenses were inserted.
The babies ranged from 1 week to 9 months of age but had the same visual experience as a newborn baby.
In fact, after just 1 hour of visual experience, these patients had the visual acuity of a 6-week-old infant! This provides evidence of experience expectant development.
When the expected visual experience is finally provided, the visual system catches up. Nonetheless, there is a sensitive period in which visual input is necessary for normal visual development
Delayed visual input affects many aspects of vision, including high-level processes such as face perception. Although some aspects of face perception take many years to develop, as little as 2 months of visual deprivation during infancy can cause permanent deficits

## Face Perception

Faces are possibly the most important visual stimuli in children's social environment, and it is important that they extract key information from others' faces
Infants show an interest in human faces soon after birth
Within hours after they are born, research shows that infants prefer to look at faces rather than other objects and to look at attractive faces more than at unattractive ones
Like visual acuity, postnatal changes in face processing are attributable to visual experience.
On the day that infants treated for bilateral cataracts (i.e., cataracts in both eyes) receive their first visual input, their face preferences are identical to those of newborn infants rather than other babies of the same age
Experience also plays a key role in infants' ability to tell faces apart. At 6 months of age, babies do not recognize faces as well as adults do,

but their ability to recognize faces is similar across all face categories (e.g., upright vs. inverted, human vs. monkey, own-ethnicity vs. other-ethnicity).
Pascalis, de Haan, and Nelson (2002) showed infants a single face during a familiarization phase.
They then showed infants a pair of faces during a test phase; one face was novel and the other had been seen during familiarization.
Both 6- and 9-month-olds show a novelty preference when tested with human faces, providing evidence that they could tell the two faces apart.
However, only 6-month-olds showed a novelty preference when tested with monkey faces. Like adults, 9-month-olds could not tell different monkeys apart.
Using a similar method, Kelly and his colleagues (2007) showed similar perceptual narrowing for human faces. Whereas 3-month-olds perceptual narrowing
Tuning of the discriminate faces from all ethnicities (e.g., Caucasian, African, Chinese, East Indian), perceptual abilities based on their ability to discriminate other-ethnicity faces declines by 9 months of age.

# Cognitive Development

Infants not only perceive sounds and visual patterns; they also develop an understanding of how objects and people work.
To navigate their world, babies must learn that objects exist even when out of view, that objects fall if not supported, that objects belong to categories, that people have goals, and that some people are “good” and others are “mean.”

## Piaget’s Theory

Piaget’s theory is a general, unifying story of how biology and experience sculpt cognitive development.
The Swiss child psychologist Jean Piaget thought that, just as our physical bodies have structures that enable us to adapt to the world, we build mental tructures that help us adapt to the world.
Adaptation involves adjusting to new environmental demands.

Piaget stressed that children actively construct their own cognitive worlds: information is not just pired into their minds from the environment
He sought to discover how children at different points in their development think about the world and how systematic changes in their thinking occur.

**Processes of Development**

Piaget (1954) argued that infants and children build schemes to organize knowledge. Whereas older children create mental schemes (e.g., strategies and plans for solving problems), babies' schemes are structured by simple actions that can be performed on objects, such as sucking, looking, and grasping
Two processes contribute to the development of schemes: assimilation and accommodation.
Assimilation occurs when children use their existing schemes to deal with new information or experiences.
Accommodation occurs when children adjust their schemes to account for new information and experiences.
Think about a toddler who has learned the word car to identify the family's automobile.
The toddler might call all moving vehicles on roads "cars," including motorcycles and trucks; the child has assimilated these bjects to their existing scheme. But the child soon learns that motorcycles and trucks are not cars and fine-tunes the category to exclude those vehicles.
The child has accommodated the scheme.
In the same way, babies discover that lots of objects can be sucked (assimilation) but then adjust their sucking to take into account differences between blankets, nipples, and soft toys (accommodation).
Piaget argued that individuals go through four stages of development as a result of these processes and that cognition is qualitatively different in one stage than in another.
The first of these stages, and the one that describes infancy, is the sensorimotor stage
The Sensorimotor Stage
Recall from Chapter 1 that in the sensorimotor stage, which lasts from birth to about age 2, infants construct an understanding of the world by coordinating sensory experiences (such as seeing and hearing) with physical, motor actions,

At the beginning of this stage, newborns have little more than reflexes to work with.
At the end of the sensorimotor stage, 2-year-olds can produce complex sensorimotor patterns and use primitive symbols.
We first summarize Piaget's descriptions of how infants develop.
Later, we consider criticisms of his view.
According to Piaget, a crowning achievement of the sensorimotor expe- rience is object permanence: the understanding that objects continue to exist even when they cannot be seen, heard, or touched.
Piaget argued that object permanence develops at 8 to 9 months of age.
Piaget opened up a new way of looking at infant cognition and provided an outstanding foundation on which contemporary research builds.
Nonetheless, newer research suggests that Piaget's view of sensorimotor development needs to be modified

## Contemporary Approaches

A number of theorists, such as Eleanor Gibson (1989) and Elizabeth Spelke (2004, 2011, 2013), have concluded that infants' perceptual abilities are highly developed very early in life.
Spelke endorses a core knowledge approach, which states that infants are born with domain-specific innate knowledge systems.
Among these knowledge systems are those involving space, number sense, object permanence, and language
Strongly influenced by evolutionary theory, the core knowledge domains are theorized to be "pre-wired" to allow infants to make sense of their world
The core knowledge approach argues that Piaget greatly underestimated the cognitive abilities of infants, especially young infants
Object permanence certainly develops earlier than Piaget thought. In his view, object permanence does not develop until approximately 8 to 9 months.
One of the first studies to change this view was conducted by Baillargeon, Spelke, and Wasserman
Rather than require infants to remove an occluder (such as a blanket covering a toy) to demonstrate object permanence, Baillargeon relied on infants' looking behayiour.

Babies look longer at novel stimuli and surprising events than at familiar stimuli and expected events. To capitalize on this, Baillargeon and colleagues habituated 5-month-olds to a display in which a screen rotated 180 degrees while resting on a table.

They then placed a box on the table and showed infants two events.

In the impossible event, the trajectory of the screen was not affected by the box (a trap door in the floor allowed the researchers to remove the box surreptitiously), making it appear as though the screen rotated right through the space occupied by the box.

In the possible event, the screen stopped rotating early, just where it should if the box continued to exist.

Babies looked longer at the impossible event (despite full rotation of the screen being the familiar stimulus), providing evidence that they understood that objects continue to exist even when out of sight.

Research by Baillargeon and her colleagues (2004, 2014; Baillargeon & others, 2012) documents that infants as young as 3 to 4 months old expect objects to be substantial (in the sense that other objects cannot move through them) and permanent (in the sense that they continue to exist when they are hidden).

This method, also dubbed violation of expectation, has been used to investigate many aspects of infants' object knowledge.

For example, the fact that babies look longer at impossible events (i.e., events that violate their expectations) has provided valuable insight into when infants understand that objects fall if not supported (Needham & Baillargeon, 1993), when they understand that a small object cannot contain a large object

## Learning, Remembering, and Conceptualizing

### Conditioning

Operant conditioning has been especially helpful to researchers in their efforts to determine what infants perceive

Carolyn Rovee-Collier (1987) has demonstrated that infants can retain information from the experience of being conditioned. In a characteristic experiment, Rovee-Collier placed a 2.5-month-old baby in a crib under an elaborate mobile

She then tied one end of a ribbon to the baby's ankle and the other end to the mobile.

Subsequently, she observed that the baby kicked and made the mobile move.
The movement of the mobile is the reinforcing stimulus (which increases the baby’s kicking behaviour) in this experiment.
Weeks later, the baby was returned to the crib, but her foot was not tied to the mobile.
The baby kicked, suggesting that she had retained the information that if she kicked a leg, the mobile would move.

**Attention**

Attention, the focusing of mental resources on select information, improves cognitive processing on many tasks
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Another study examined 7- and 8-month-old infants’ visual attention to sequences of events that varied in complexity
The infants tended to look away from events that were overly simple or complex, preferring instead to attend to events of intermediate complexity.
Another aspect of attention that plays an important role in infant development is joint attention, in which individuals focus on the same object or event
Joint attention requires (1) the ability to track each other’s behaviour, such as following someone’s gaze; (2) one person directing another’s attention; and (3) reciprocal interaction. Early in infancy, joint attention usually involves a caregiver pointing or using words to direct an infant’s attention.
Emerging forms of joint attention occur at about 7 to 8 months, but it is not until 10 to 11 months that joint attention skills are frequently observed
By their first birthday, infants have begun to direct adults’ attention to objects that capture their interest
Joint attention plays an important role in many aspects of infant development and considerably increases infants’ ability to learn from other people
Joint attention skills in infancy are also associated with the development of self-regulation later in childhood.

**Imitation**

Infant development researcher Andrew Meltzoff (2004, 2007, 2011) has conducted numerous studies of infants' imitative abilities.
He sees these abilities as biologically based, because infants can imitate a facial expression within the first few days after birth.
He also emphasizes that the infant's imitative abilities do not resemble a hardwired response but rather involve flexibility and adaptability.
In Meltzoff's observations of infants during the first 72 hours of life, the infants gradually displayed more complete imitation of an adult's facial expression, such as sticking out the tongue or opening the mouth wide
Not all researchers agree on the mechanisms underlying imitation in newborns.
Nonetheless, individual differences in imitation might be significant.
Meltzoff (2005, 2011; Meltzoff & Williamson, 2013) has also studied deferred imitation, which occurs after a time delay of hours or days.
Piaget held that deferred imitation does not occur until about 18 months.
Meltzoff's research suggested that it occurs much earlier.
In one study, Meltzoff (1988) demonstrated that 9-month-old infants could imitate actions—such as pushing a recessed button in a box, which produced a beeping sound— that they had seen performed 24 hours earlier.

**Memory**

Meltzoff's studies of deferred imitation suggest that infants have another important cognitive ability: memory, which involves the retention of information over time.
Sometimes information is retained for only a few seconds, and at other times it is retained for a lifetime.
Some researchers, such as Rovee-Collier (2008), have concluded that infants as young as 2 to 6 months can remember some experiences through 1% to 2 years of age.
However, critics such as Jean Mandler (2000), a leading expert on infant cognition, argue that the infants in Rovee-Collier's experiments are displaying only implicit memory.
Implicit memory refers to memory without conscious recollection—memories of skills and routine procedures that are performed automatically.
In contrast, explicit memory refers to conscious memory of facts and experiences.

When people think about memory, they are usually referring to explicit memory.
Most researchers find that babies do not show explicit memory until the second half of the first year
Explicit memory improves substantially during the second year of life
In one longitudinal study, infants were assessed several times during their second year
The older infants showed more accurate memory and required fewer prompts to demonstrate their memory than did younger infants.
As indicated, researchers have documented that 6-month- olds can remember information for 24 hours but 20-month- olds can remember information they encountered 12 months earlier.

## Autobiographical Memory

Most adults can remember little, if anything, from the first 3 years of their life. This is called infantile or childhood amnesia.
The few memories that adults are able to report of their life at age 2 or 3 are at best very sketchy
In one study, children's memory for events that occurred at 3 years of age were periodically assessed through age 9
By 8 to 9 years of age, children's memory of events that occurred at 3 years of age began to significantly fade away.
One reason older children and adults have difficulty recalling events from their infant and early childhood years is that during these years the prefrontal lobes of the brain are immature, and this area of the brain is believed to play an important role in storing memories of events

## Concept Formation and Categorization

Along with attention, imitation, and memory, concepts are a key aspect of infants' cognitive development
Concepts are cognitive groupings of similar objects, events, people, or ideas.
Without concepts, you would see each object and event as unique; you would not be able to make any generalizations.
Using habituation experiments like those described earlier in the chapter, some researchers have found that infants as young as 3 months of age can group objects with similar appearances (Quinn & others, 2013).

This research capitalizes on the knowledge that infants are more likely to look at a novel object than at a familiar one.
Learning to sort things into the correct categories—what makes something one kind of thing rather than another kind of thing, such as what makes a bird a bird, or a fish a fish—is an important aspect of learning

# Language Development

## Defining Language

Language is a form of communication—whether spoken, written, or signed—that is based on a system of symbols. Language consists of the words used by a community and the rules for varying and combining them.
All human languages have some common characteristics, such as organizational rules and infinite generativity
Rules describe the way the language works.
Infinite generativity is the ability to produce an endless number of meaningful sentences using a finite set of words and rules

## How Language Develops

Whatever language they learn, infants all over the world follow a similar path in language development.
What are some key milestones in this development?

### Babbling and Gestures

Babies actively produce sounds from birth onward.
The effect of these early communications is to attract attention
Babies' sounds and gestures go through the following sequence during the first year:
Crying. Babies cry even at birth. Crying can signal distress, but as we will discuss later, different types of cries signal different things.
Cooing. Babies first coo at about 2 to 4 months. Coos are gurgling sounds that are made in the back of the throat and usually express pleasure during interaction with the caregiver.

Babbling. In the middle of the first year, babies babble—that is, they produce strings of consonant-vowel combinations such as “ba, ba, ba, ba.”
Gestures. Infants start using gestures, such as showing and pointing, at about 8 to 12 months (Goldin-Meadow, 2015, 2017).
They may wave bye-bye, nod to mean “yes,” and show an empty cup to ask for more milk. Lack of pointing is a significant indicator of problems in the infant’s communication system

### Recognizing Language Sounds

Long before they begin to learn words, infants can make fine distinctions among the sounds of a language
In Patricia Kuhl’s research, phonemes (the basic sound units of a language) from languages all over the world are piped through a speaker for infants to hear
Kuhl then uses operant conditioning to see whether infants can discriminate phonemes universally (i.e., from all languages).
A box with a toy bear in it is placed where the infant can see it. A string of identical syllables is played, and periodically the syllables are changed (for example, ba ba ba ba and then pa pa pa pa).
If the infant turns its head when the syllables change, the box lights up and the bear dances and drums, rewarding the infant for noticing the change
Kuhl’s research has demonstrated that from birth up to about 6 months, infants are “citizens of the world’: they can tell when sounds change most of the time no matter what language the syllables come from.
But over the next 6 months, infants growing up in a monolingual environment get even better at perceiving changes in sounds from their “own” language, the one their parents speak, and gradually lose the ability to recognize differences that are not important in their own language

### First Words

Infants understand words before they can produce or speak them
In other words, receptive vocabulary (words the child understands) considerably exceeds spoken vocabulary (words the child uses).
On average, infants understand about 50 words at the age of 13 months, but they can’t say that many words until about 18 months.

The infant’s first spoken word, a milestone eagerly anticipated by every parent, usually doesn’t occur until 10 to 15 months of age and happens at an average of about 13 months.
Yet long before babies say their first words, they have been communicating with their parents, often by gesturing and using their own special sounds.
The appearance of first words is a continuation of this communication process.
A child’s first words include those that name important people (dada), familiar animals (kitty), vehicles (car), toys (ball), food (milk), body parts (eye), clothes (hat), household items (clock), and greeting terms (bye).
Children often express various intentions with their single words, so that “cookie” might mean, “That’s a cookie” or “T want a cookie.”
Nouns are easier to learn because the majority of words in this class are more perceptually accessible than other types of words

**Two-Word Utterances**

By the time children are 18 to 24 months of age, they usually produce two-word utterances.
To convey meaning with just two words, the child relies heavily on gesture, tone, and context.
The wealth of meaning children can communicate with a two-word utterance includes the following
identification—“See doggie”;
location— “Book there”;
repetition—“More milk”;
negation—“Not wolf’;
possession—“My candy”; attribution—‘Big car”; and
question—“Where ball?
Notice that two-word utterances omit many parts of speech and are remarkably succinct.
In fact, in every language a child’s first combinations of words have this economical quality; they are telegraphic.
Telegraphic speech is the use of short, precise words without grammatical markers such as articles, auxiliary verbs, and other connectives.

Telegraphic speech is not limited to two words; “Mommy give ice cream” and “Mommy give Tommy ice cream” are also examples of telegraphic speech.

## Biological and Environmental Influences

Everyone who uses language in some way “knows” its rules and can create an infinite number of words and sentences.
Where does this knowledge come from?
Is it the product of biology, or is language learned and influenced by experiences?

### Biological Influences

The ability to speak and understand language requires a certain vocal apparatus as well as a nervous system with specific capabilities.
The nervous system and vocal apparatus of humans’ predecessors changed over hundreds of thousands of years
With advances in the nervous system and vocal structures Homo sapiens went beyond the grunting and shrieking of other animals
Two area in the brain involved in language were first discovered in studies of a brain damaged individual
Broca’s area, an area in the left frontal lobe involved in producing words
Werinckes area, a region of the brain’s left hemisphere involved in language comprehension
Noam Chomsky proposed that humans are hardwired to learn language at a certain time and in a certain way
he said that children are born into a world with a language acquision device, a biological endowment that enables the child to detect the various features and rules of language

### Environmental Influences

Decades ago, behaviourists opposed Chomsky’s hypothesis and argued that language represents nothing more than chains of responses acquired through reinforcement (Skinner, 1957).
A baby happens to babble “Ma-ma”; Mama rewards the baby with hugs and smiles; the baby says “Mama” more and more frequently. Bit by bit, said the behaviourists, the baby’s language is built up in this way.

According to behaviourists, language is a complex, learned skill, much like playing the piano or dancing.
The behavioural view of language learning has problems.
First, it does not explain how people create novel sentences—sentences they have never heard or spoken before.
Second, it does not account for how children learn the syntax of their native language even if they are not reinforced for doing so.
Social psychologist Roger Brown (1973) spent long hours observing parents and their young children.
He found that parents did not directly or explicitly reward or correct the syntax of most children's utterances.
That is, parents did not say "good," "correct," "right," "wrong," and so on.
Parents also did not offer direct corrections such as "You should say 'two shoes,' not 'two shoe.'"
However, as we will see shortly, many parents do expand on their young children's grammatically incorrect utterances and recast many of those that contain grammatical errors.
The behavioural view is no longer considered a viable explanation of how children acquire language.
But a great deal of research describes how children's environmental experiences influence their language skills (Houston & others, 2016).
Many language experts argue that a child's experiences, the particular language to be learned, and the context in which learning takes place can strongly influence language acquisition
Language is not learned in a social vacuum.
Most children are bathed in language from a very early age.
The support and involvement of caregivers and teachers greatly facilitate a child's language learning
In particular, researchers have documented how important early speech input and poverty are for the development of a child's language skills
Betty Hart and Todd Risley (1995) observed the language environments of children whose parents were professionals and children whose parents were on welfare.
Compared with the professional parents, the parents on welfare talked much less to their young children, talked less about past events, and provided less elaboration.
The children of the professional parents had a much larger vocabulary at 36 months than the children of the parents on welfare did.

Keep in mind, though, that individual variations characterize language development and that some parents on welfare do spend considerable time talking to their children.
Another study found that at 18 to 24 months of age, infants in low-SES (socioeconomic status) families already had a smaller vocabulary and less efficient language processing than their infant counterparts in middle-SES families
One intriguing component of the young child's linguistic environment is child directed speech (also referred to as "parentese'"'), which is language spoken in a higher-than-usual pitch, slower tempo, and exaggerated intonation, with simple words and sentences
It is hard for most adults to use child-directed speech when not in the presence of a baby.
As soon as adults start talking to a baby, though, they often shift into child-directed speech.
Much of this is automatic and something most parents are not aware they are doing.
Even 4-year-olds speak in simpler ways to 2-year-olds than to their 4-year-old friends.
Child-directed speech has the important function of capturing the infant's attention and maintaining communication
Adults often use strategies other than child-directed speech to enhance the child's acquisition of language, including recasting, expanding, and labelling.
Recasting is rephrasing something the child has said, perhaps turning it into a question or restating the child's immature utterance in the form of a fully grammatical sentence.
For example, if the child says, "The dog was barking," the adult can respond by asking, "When was the dog barking?"
Effective recasting lets the child indicate an interest and then elaborates on that interest.
Expanding is restating, in a linguistically sophisticated form, what a child has said. For example, a child says, "Doggie eat," and the parent replies, "Yes, the doggie is eating." Labelling is identifying the names of objects.
Young children are forever being asked to identify the names of objects.
Roger Brown (1958) called this "the original word game" and claimed that much of a child's early vocabulary learning is motivated by this adult pressure to identify the words associated with objects.

Parents use these strategies naturally and in meaningful conversations. Parents do not (and should not) use any deliberate method to teach their children to talk, even with children who are slow in learning language.

Children usually benefit when parents guide their discovery of language rather than overloading them; “following in order to lead” helps a child learn language. If children are not ready to take in some information, they are likely to indicate this, perhaps by turning away. Thus, giving the child more information is not always better.

Infants, toddlers, and young children benefit when adults read books to and with them, a process called shared reading

One study revealed that joint attention at 12 and 18 months predicted language skills at 24 months of age

What are some effective ways that parents can facilitate their children’s language development? They include the following strategies (Baron, 1992; Galinsky, 2010):

Be an active conversational partner. Initiate conversation with the baby.

Talk at a slowed-down pace and don’t worry about how you sound to other adults when you talk to your baby.

Talking at a slowed-down pace will help your baby detect words in the sea of sounds they experience.

Use parent-look and parent-gesture, and name what you are looking at. When you want your child to pay attention to something, look at it and point to it. Then name it—for example, by saying “Look, Alex, it’s an airplane.”

When you talk with infants and toddlers, be simple, concrete, and repetitive. Don’t try to talk to them in abstract, high-level ways and think you have to say something new or different all the time. Using familiar words often will help them remember the words.

Play games. Use word games like peek-a-boo and pat-a-cake to help infants learn words.

Remember to listen. Since toddlers’ speech is often slow and laborious, parents are frequently tempted to supply words and thoughts for them. Be patient and let toddlers express themselves.

Expand and elaborate language abilities and horizons with infants and toddlers

Ask questions that encourage answers other than “Yes” and “No.”

Actively repeat, expand, and recast the utterances. Your toddler might

say, “Dada.” you could follow with, “Where’s Dada?,” and then you might continue, “Let’s go find him.”

#### An Interactionist View

Language acquisition depended only on biology, Genie and the Wild Boy of Aveyron (discussed earlier in the chapter) should have talked without difficulty.
A child’s experiences do influence language acquisition (Houston & others, 2016; Pace & others, 2016). But we have seen that language also has strong biological foundations (Dubois & others, 2016); no matter how much you converse with a dog, it won't learn to talk.
Unlike dogs, children are biologically equipped to learn language (McMurray, 2016; Pinker, 2015).
Children all over the world acquire language milestones at about the same time and in about the same order.
An interactionist view emphasizes that both biology and experience contribute to language development
This interaction of biology and experience can be seen in variations in the acquisition of language.
Children vary in their ability to acquire language, and this variation cannot be completely explained by differences in environmental input.
However, virtually every child benefits enormously from opportunities to talk and be talked with.
Children whose parents and teachers provide them with a rich verbal environment show many positive outcomes
Parents and teachers who pay attention to what children are trying to say, expand their children’s utterances, read to them, and label things in the environment are providing valuable, if unintentional, benefits

# Chapter 4: Socioemotional Development in Infancy

## Emotional and Personality Development

Anyone who has been around infants for even a brief time can tell that they are emotional beings.

Not only do infants express emotions, but they also vary in temperament.
Some are shy and others outgoing. Some are active and others much less so.

## Emotional Development

Imagine what your life would be like without emotion.
Emotion is the colour and music of life, as well as the tie that binds people together.
How do psychologists define and classify emotions, and why are they important to development? How do emotions develop during the first 2 years of life?

### What Are Emotions?

For our purposes, we will define emotion as feeling, or affect, that occurs when a person is in a state or an interaction that is important to them, especially to their well-being.
Especially in infancy, emotions have important roles in communication with others and in behavioural organization.
Through emotions, infants communicate such important aspects of their lives as joy, sadness, interest, and fear
In terms of behavioural organization, emotions influence infants' social responses and adaptive behaviour as they interact with others in their world
Psychologists classify the broad range of emotions in many ways, but almost all classifications designate an emotion as either positive (pleasant) or negative (unpleasant)
Positive emotions include happiness, joy, love, and enthusiasm.
Negative emotions include anxiety, anger, fear, and sadness.

### Early Emotions

Emotions that infants express in the first 6 months of life include surprise, interest, joy, anger, sadness, fear, and disgust
There is debate about when other emotions, such as jealousy, empathy, embarrassment, pride, shame, and guilt, appear.
These later-developing emotions have been called self-conscious or other-conscious emotions because they involve the emotional reactions of others

Most experts, such as Jerome Kagan (2010, 2013) and Joseph Campos (2009), argue that so-called self-conscious emotions don't occur until after the first year, a view that is increasingly shared by most developmental psychologists.
Indeed, the structural immaturity of the infant brain makes it unlikely that emotions that require thought can be experienced in the first year.

## Biological and Environmental Influences

Emotions are influenced by biological foundations and by a person's experiences
Two lines of evidence reveal the importance of biological foundations.
First, children who are blind from birth and have never observed the smile or frown on another person's face nonetheless smile and frown in the same way that children with normal vision do.
Second, facial expressions of basic emotions such as happiness, surprise, anger, and fear are very similar across cultures.
Nonetheless, infants' emotions are influenced by both momentary and stable characteristics of their caregivers' emotions.
Babies pick up on momentary changes in their mothers' stress.
In a study by Waters and colleagues (Waters, West, & Mendes, 2014), mothers were separated from their babies and required to give a 5-minute speech.
The independent variable was the type of evaluation mothers received: half received a positive evaluation and half received a negative evaluation.
Mothers who received negative feedback reported an increase in negative emotion and cardiac stress, while those who were given positive feedback reported an increase in positive emotion.
The dependent variable was infant heart rate when mothers and infants were reunited.
Babies whose mothers received negative feedback showed an increased heart rate, and the greater the mother's stress response, the more her baby's heart rate increased.
This pattern of results provides evidence that infants quickly detected their mothers' stress.
Such an effect can be observed in daily life; when toddlers hear their parents quarrelling, they often react with distress and inhibit their play.

Emotion-linked interchanges provide the foundation for the infant’s attachment to the parent so stable differences among families will affect the infant’s emotional development and the type of attachment they form—something we will get to later in this chapter.
Positive emotional exchanges are beneficial to development. Well-functioning families make each other laugh and may develop a light mood to defuse conflicts.
A study of 18- to 24-month-olds found that parents’ elicitation of talk about emotions was associated with their toddlers’ sharing and helping behaviours
All infants become stressed from time to time, but sensitive caregiving is associated with better biological recovery when stressors do occur
In contrast, emotional development and coping with stress are impaired when caregivers have maltreated or neglected children and when children’s caregivers are depressed
Emotional exchanges also vary from culture to culture.
For example, display rules—rules governing when, where, and how emotions should be expressed—are not universal.
East Asian infants display less frequent and less intense positive and negative emotions than do Caucasian infants
Throughout childhood, East Asian parents encourage their children to show emotional reserve rather than to be emotionally expressive

**Infants’ Emotional Expressions and Relationships**

Emotional expressions are involved in infants’ first relationships. The emotional bond between infants and their caregivers emerges through coordinated interactions with their caregivers
Not only do parents change their emotional expressions in response to those of their infants (and each other), but infants also modify their emotional expressions in response to those of their parents.
In other words, these interactions are mutually regulated. Because of this coordination, the interactions between parents and infants are described as reciprocal, or synchronous, at least when all is going well.
How do infants communicate with their caregivers?
Cries and smiles are babies’ first forms of emotional communication

Crying

Crying is the most important mechanism newborns have for communicating with their world.

Cries may also provide information about the health of the newborn's central nervous system.
Newborns even tend to respond with cries and negative facial expressions when they hear other newborns cry
Although crying is universal, a study by Jones (2012) revealed that newborns of depressed mothers showed less vocal distress when another infant cried, reflecting emotional and physiological dysregulation.
Even for something as basic as crying, then, early experience matters.
Babies have at least three types of cries:
Basic cry:
A rhythmic pattern that usually consists of a cry, followed by a briefer silence, then a shorter whistle that is somewhat higher in pitch than the main cry, then another brief rest before the next cry.
Some experts believe that hunger is one of the conditions that incite the basic cry.
Anger cry:
A variation of the basic cry, with more excess air forced through the vocal cords.
Pain cry:
A sudden, long, initial loud cry followed by the holding of the breath; no preliminary moaning is present.
The pain cry may be stimulated by physical pain or by any high-intensity stimulus.
Most adults can determine whether an infant's cries signify anger or pain
Parents can distinguish among the various cries of their own baby better than among those of another baby.
Many developmental psychologists recommend that parents soothe a crying infant, especially in the first year.
Problems in infant soothability at 6 months of age have been linked to insecure attachment at 12 months of age providing more evidence that early emotional responses matter. In other words, responding positively to an infant's cry teaches the infant that the world is a safe and trustworthy place.

Smiling

Smiling is a critical social skill and a key social signal (Sauter, McDonald, Grangi, & Messinger, 2014).

Two types of smiling can be distinguished in infants:
Reflexive smile:
A smile that does not occur in response to external stimuli and appears during the first month after birth, usually during sleep.
Social smile:
A smile that occurs in response to an external stimulus, typically a face in the case of the young infant. Social smiling occurs as early as 2 months of age.
Research has found that smiling and laughter at 7 months of age are associated with self-regulation at 7 years of age
One study found that higher maternal effortful control and positive emotionality predicted more initial infant smiling and laughter, while a higher level of parenting stress predicted a lower trajectory of infant smiling and laughter

Fear

One of a baby's earliest emotions is fear, which typically first appears at about 6 months and peaks at about 18 months.
The display of fear is shaped by experience; abused and neglected infants can show fear as early as 3 months (Witherington & others, 2010).
The most frequent expression of an infant's fear involves stranger anxiety, in which an infant shows fear and wariness of strangers.
Stranger anxiety usually emerges gradually. It first appears at about 6 months in the form of wary reactions.
By 9 months, fear of strangers is often more intense, and it continues to escalate through the infant's first birthday
Not all infants show distress when they encounter a stranger.
Besides individual variations, whether an infant shows stranger anxiety also depends on the social context and the characteristics of the stranger.
Infants show less stranger anxiety when they are in familiar settings.
Also, infants show less stranger anxiety when they are sitting on their mothers' laps than when they are in an infant seat several feet away from their mothers
Thus, it appears that when infants feel secure, they are less likely to show stranger anxiety.
Who the stranger is and how the stranger behaves also influence stranger anxiety in infants.

Infants are less fearful of child strangers than of adult strangers.
They also are less fearful of friendly, outgoing, smiling strangers than of passive, unsmiling strangers
In addition to stranger anxiety, infants experience fear of being separated from their caregivers.
The result is separation protest—crying when the caregiver leaves.
A study of four different cultures found that separation protest peaked at about 13 to 15 months

Social Referencing

Infants not only express emotions like fear but also “read” the emotions of other people
Social referencing involves “reading” emotional cues in others to help determine how to act in a particular situation.
The development of social referencing helps infants interpret ambiguous situations more accurately, as when they encounter a stranger
By the end of the first year, a parent’s facial expression—either smiling or fearful—influences whether an infant will explore an unfamiliar environment.
Infants become better at social referencing in the second year of life.
At this age, they tend to “check” with their caregiver before they act; they look at their caregiver to see if they are happy, angry, or fearful.
Whether an infant attempts to climb up the stairs or approach a new toy depends in part on the signals received from caregivers.

**Emotion Regulation and Coping**

During the first year, the infant gradually develops an ability to inhibit, or minimize, the intensity and duration of emotional reactions
From early in infancy, babies put their thumbs in their mouths to soothe themselves.
In their second year, they may say things to help soothe themselves.
When placed in his bed for the night, after a little crying and whimpering, a 20-month-old was overheard saying, “Go sleep, Alex. Okay.”
Later in infancy, when they become aroused, infants sometimes redirect their attention or distract themselves in order to reduce their arousal.

By age 2, children can use language to define their feeling states and identify the context that is upsetting them
A 2-year-old might say, “Doggy scary.”
This type of communication may cue caregivers to help the child regulate emotion. But at first, infants depend mainly on caregivers to help them soothe their emotions, as when a caregiver rocks an infant to sleep, sings lullabies, gently strokes the infant, and so on.
Caregivers’ actions influence the infant’s neurobiological regulation of emotions
By soothing the infant, caregivers help infants modulate their emotions and reduce the level of stress hormones
Many developmental psychologists believe that it is a good strategy for a caregiver to soothe an infant before the infant gets into an intense, agitated, uncontrolled state
Contexts can influence emotion regulation
Infants are often affected by fatigue, hunger, time of day, where they are, and the people around them.
Infants must learn to adapt to different contexts that require emotion regulation.
Further, new demands appear as the infant becomes older and parents modify their expectations.

## Temperament

Do you get upset easily?
Does it take much to get you angry or to make you laugh?
Even at birth, babies seem to have different emotional styles.
One infant is cheerful and happy much of the time; another seems to cry constantly.
One toddler arrives at a new play group only to stand beside their mother and watch from a distance; another races around the room playing with toys and interacting with other children.
These tendencies reflect temperament, or individual differences in behavioural styles, emotions, and characteristic ways of responding.
With regard to its link to emotion, temperament refers to individual differences in how quickly the emotion is shown, how strong it is, how long it lasts, and how quickly it fades away

### Describing and Classifying Temperament

Researchers have described and classified the temperaments of individuals in different ways

Here we examine three of those ways.

Chess and Thomas's Classification

Psychiatrists Alexander Chess and Stella Thomas (Chess & Thomas, 1977; Thomas & Chess, 1991) identified three basic types, or clusters, of temperament:

Easy child;

This child is generally in a positive mood, quickly establishes regular routines in infancy, and adapts easily to new experiences.

Difficult child:

This child reacts negatively and cries frequently, engages in irregular daily routines, and is slow to accept change.

Slow-to-warm-up child:

This child has a low activity level, is somewhat negative, and displays a low intensity of mood.

In their longitudinal investigation, Chess and Thomas found that 40 percent of the children they studied could be classified as easy, 10 percent as difficult, and 15 percent as slow to warm up.

Notice that 35 percent did not fit any of the three patterns.

Researchers have found that these three basic clusters of temperament are moderately stable across the childhood years

Kagan's Concept of Behavioural Inhibition

Another way of classifying temperament focuses on the differences between a shy, subdued, timid child and a sociable, extroverted, bold child.

Jerome Kagan (2002, 2010, 2013) regards shyness with strangers (peers or adults) as one feature of a broad temperament category called inhibition to the unfamiliar.

Inhibited children react to many aspects of unfamiliarity with initial avoidance, distress, or subdued affect, beginning around 7 to 9 months. In a visit to the lab, inhibited infants do not approach new toys, stay close to their caregiver (a secure base), and are distressed by a toy robot; other infants play with new toys and leave their caregiver's side—although they might keep a close eye on them!

In one study, having an inhibited temperament at 2 to 3 years of age was related to having social phobia symptoms at 7 years of age (Lahat & others, 2014).

Other findings indicate that infants and young children who have an inhibited temperament are at risk for developing social anxiety disorder in adolescence and adulthood
Effortful Control (Self-Regulation)
Mary Rothbart and John Bates (2006) stress that effortful control (self-regulation) is an important dimension of temperament.
Infants who are high in effortful control show an ability to keep their arousal from getting too intense and have strategies for soothing themselves.
By contrast, children who are low in effortful control are often unable to control their arousal; they are easily agitated and become intensely emotional.
One study found that young children higher in effortful control were more likely to wait longer to express anger and were more likely to use the self-regulatory strategy of distraction
Another study revealed that effortful control was a strong predictor of academic success skills in kindergarten children from low-income families
An important point about temperament classifications is that children should not be pigeonholed as having only one temperament dimension, such as "difficult or "negative."
A good strategy when attempting to classify a child's temperament is to think of temperament as consisting of multiple dimensions (Bates, 2012a, b).
For example, a child might be extroverted, show little emotional negativity, and have good self- regulation.
Another child might be introverted, show little emotional negativity, and have a low level of self-regulation

## Biological Foundations and Experience

### Biological Influences

How does a child acquire a certain temperament? Many researchers argue that children inherit a physiology that predisposes them to have a particular type of temperament (Clauss, Avery, & Blackford, 2015; Kagan, 2010, 2013).
In particular, an inhibited temperament is associated with a unique physiological pattern that includes a high and stable heart rate, high

levels of the hormone cortisol, and high activity in the right frontal lobe of the brain (Kagan, 2013).

This pattern may be tied to the excitability of the amygdala, a structure in the brain that plays an important role in fear and inhibition.

Twin and adoption studies also suggest that heredity has a moderate influence on differences in temperament within a group of people (Plomin, DeFries, McClearn, & McGuffin, 2009),

## Experience

Although biology influences temperament, experience also plays an important role.

Children may learn to reduce their fear and inhibition to some degree.

As we'll see below, both parents and child-care workers affect the development of temperament.

## Gender, Culture, and Temperament

Gender may be an important factor shaping the context that influences temperament.

Parents might react differently to an infant's temperament based on whether the baby is a boy or a girl (Gaias & others, 2012).

For example, in one study, mothers were more responsive to the crying of irritable girls than to that of irritable boys (Crockenberg, 1986).

Similarly, the reaction to an infant's temperament may depend in part on culture (Chen, Fu, & Zhao, 2015; Chen & Schmidt, 2015).

For example, an active temperament is valued more in some cultures (such as Canada) than in others (such as China) (Cole, 2016).

In short, many aspects of a child's environment can encourage or discourage the persistence of temperament characteristics (Goodvin & others, 2015).

One useful way of thinking about these relationships applies the concept of goodness of fit, which we examine next.

## Goodness of Fit and Parenting

Many parents don't come to believe in the importance of temperament until the birth of their second child.

They viewed their first child’s behaviour as stemming from how they treated the child. But then they find that some strategies that worked with their first child are not as effective with their second child.
Perhaps their first child needed encouragement to approach new people and toys, but their second child shows no fear of novelty.
Such experiences strongly suggest that children differ from each other very early in life and that these differences have important implications for parent-child interaction
Goodness of fit refers to the match between a child’s temperament and the environmental demands the child must cope with.
Suppose Jason is an active toddler who is made to sit still for long periods and Jack is a slow-to-warm-up toddler who is abruptly pushed into new situations on a regular basis.
Both Jason and Jack face a lack of fit between their temperament and environmental demands. Lack of fit can produce adjustment problems
Researchers have found that decreases in infants’ negative emotionality are linked to higher levels of parental sensitivity, involvement, and responsivity
What are the implications of temperamental variations for parenting?
Decreases in infants’ negative emotionality occur when parents are more involved, responsive, and sensitive when interacting with their children
How might caregivers help a child become less fearful and inhibited?
An important first step is to find out what frightens the child.
Comforting and reassuring the child and addressing their specific fears are good strategies.
Temperament experts Ann Sanson and Mary Rothbart (1995) also recommend the following strategies for temperament-sensitive parenting:
Pay attention to and respect the child’s individuality. One implication is that it is difficult to generate general prescriptions for “good parenting.”
A goal might be accomplished in one way with one child and in another way with another child, depending on each child’s temperament.
Parents need to be flexible and sensitive to the infant’s signals and needs.
Structure the child’s environment.
Crowded, noisy environments can pose greater problems for some children (such as a “difficult child”) than for others (such as an “easy

child”). We might also expect that a fearful, withdrawing child would benefit from slower entry into new contexts.
Avoid applying negative labels to the child.
Acknowledging that some children are harder to parent than others is often helpful, and advice on how to handle particular kinds of difficult circumstances can be helpful.
However, labelling a child “difficult” runs the risk of becoming a self-fulfilling prophecy. That is, if a child is identified as “difficult,” people may treat them in a way that elicits “difficult” behaviour.
In this final comment about temperament, we mention the differential susceptibility model and the biological sensitivity to context model
These models emphasize that certain characteristics—such as a difficult temperament—that render children more vulnerable to difficulty in adverse contexts also make them more susceptible to optimal growth in very supportive conditions.
These models may help us see “negative” temperament characteristics in a new light.
For example, one study revealed that young children with a difficult temperament showed more problems when they experienced low-quality child care and fewer problems when they experienced high-quality child care than did young children with an easy temperament

## Personality Development

Emotions and temperament are key aspects of personality, the enduring personal characteristics of individuals.
Let’s now examine characteristics that are often thought of as central to personality development during infancy: trust, the development of a sense of self, and progress toward independence.

### Trust

According to Erikson (1968), the first year of life is characterized by the trust-versus mistrust stage of development.
Upon emerging from a life of regularity, warmth, and protection in the mother’s womb, the infant faces a world that is less secure.
Erikson proposed that infants learn trust when they are cared for in a consistently nurturant manner.
If the infant is not well fed and kept warm on a consistent basis, a sense of mistrust is likely to develop.

In Erikson’s view, the issue of trust versus mistrust is not resolved once and for all in the first year of life.
It arises again at each successive stage of development, and the outcomes can be positive or negative.
For example, children who leave infancy with a sense of trust can still have their sense of mistrust activated at a later stage, perhaps if their parents become separated or divorced.

**The Developing Sense of Self**

It is difficult to study the self in infancy mainly because infants cannot tell us how they experience themselves.
Infants cannot verbally express their views of the self.
They also cannot understand complex instructions from researchers.
A rudimentary form of self-recognition—being attentive and positive toward one’s image in a mirror—appears as early as 3 months
However, a central, more complete index of self-recognition—the ability to recognize one’s physical features—does not emerge until the second year
One ingenious strategy to test infants’ visual self-recognition is the use of a mirror technique in which an infant’s mother first puts a dot of rouge on the infant's nose.
Then, an observer watches to see how often the infant touches their nose.
Next, the infant is placed in front of a mirror and observers detect whether nose touching increases.

**Independence**

Not only does the infant develop a sense of self in the second year of life, but independence also becomes a more central theme in the infant’s life.
Erikson (1968) stressed that independence is an important issue in the second year of life.
Erikson’s second stage of development is identified as autonomy versus shame and doubt.
Autonomy builds as the infant’s mental and motor abilities develop.
At this point, not only can infants walk, but they can also climb, open and close, drop, push and pull, and hold and let go.
Infants feel pride in these new accomplishments and want to do everything themselves, whether the activity is flushing a toilet, pulling

the wrapping off a package, or deciding what to t. It is important to recognize toddlers’ motivation to do what they are capable of t. It is important to recognize toddlers’ motivation to do what they are capable of.
It is important to recognize toddlers’ motivation to do what they are capable of doing at their own pace.
Then they can learn to control their muscles and their impulses themselves.
Conversely, when caregivers are impatient and do for toddlers what they are capable of doing themselves, shame and doubt develop.

# Social Orientation and Attachment

## Social Orientation and Understanding

Is infants develop the ability to crawl, walk, and run, they are able to explore and expand their social world. Enhanced locomotor and cognitive skills influence, and are influenced by, social relationships—reminding us that these processes are intricately intertwined

### Social Orientation

From early in their development, infants are captivated by the social world.
Young infants are attuned to the sounds of human voices and stare intently at faces, especially their caregiver’s face
Within minutes of birth, infants look preferentially toward face-like patterns and as they develop, they become adept at interpreting facial expressions
Face-to-face play often begins to characterize caregiver-infant interactions when the infant is about 2 to 3 months of age.
Such play reflects many parents’ motivation to create a positive emotional state in their infants
Infants also learn about the social world through contexts other than face-to-face play with a caregiver.
Even though infants as young as 6 months show an interest in each other, their interaction with peers increases considerably in the latter half of the second year.

Between 18 and 24 months, children markedly increase their imitative and reciprocal play—for example, imitating nonverbal actions like jumping and running

### Intention, Goal-Directed Behaviour, and Cooperation

The ability to perceive people as engaging in intentional and goal-directed behaviour is an important social-cognitive accomplishment, and this initially occurs toward the end of the first year
Joint attention and gaze-following help the infant understand that other people have intentions
The ability to link intentions with emotional expressions develops during the second year of life

### Infants' Social Sophistication and Insight

In sum, researchers are discovering that infants are more socially sophisticated and insightful at younger ages than was previously envisioned
This sophistication and insight is reflected in infants' perceptions of others' actions as intentionally motivated and goal directed and in their motivation to share and participate in that intentionality by their first birthday
The more advanced social-cognitive skills of infants could be expected to influence their understanding and awareness of attachment to a caregiver.

## Attachment

Attachment is a close emotional bond between two people.
There is no shortage of theories about infant attachment.
Three theorists—Freud, Erikson, and Bowlby—proposed influential views of attachment.
Freud theorized that infants become attached to the person or object that provides them with oral satisfaction.
For most infants, this is the mother, since she is most likely to feed the infant.
Is feeding as important as Freud thought?
A classic study by Harry Harlow (1958) indicates that the answer is no (see Figure 4.5). Harlow removed infant monkeys from their mothers at birth; for 6 months they were fed by two surrogate (substitute)

“mothers.” One surrogate mother was made of wire, the other of cloth. Half of the infant monkeys were fed by the wire mother, half by the cloth mother. Periodically, the amount of time the infant monkeys spent with either the wire or the cloth mother was computed. Regardless of which mother fed them, the infant monkeys spent far more time with the cloth mother. Even if the wire mother, but not the cloth mother, provided nourishment, the infant monkeys spent more time with the cloth mother. And when Harlow frightened the monkeys, those who were “raised” by the cloth mother ran to that mother and clung to it. Those who were raised by the wire mother did not run to the wire mother; they too ran to the cloth mother. Whether the mother provided comfort seemed to determine whether the monkeys associated that mother with security. This study clearly demonstrated that feeding is not the crucial element in the attachment process and that contact comfort is important.

Physical comfort also plays a role in Erikson’s (1968) view of the infant’s development

Recall Erikson’s proposal that during the first year of life infants are in the stage of trust versus mistrust.

Physical comfort and sensitive care, according to Erikson (1968), are key to establishing a basic level of trust during infancy.

The infant’s sense of trust, in turn, is the foundation for attachment and sets the stage for a lifelong expectation that the world will be a good and pleasant place

The ethological perspective of British psychiatrist John Bowlby (1969, 1989) also stresses the importance of attachment in the first year of life and the responsiveness of the caregiver.

Bowlby believed that both the infant and their primary caregivers are biologically predisposed to form attachments.

He argued that the newborn is biologically equipped to elicit attachment behaviour.

The baby cries, clings, coos, and smiles.

Later, the infant crawls, walks, and follows the caregiver. The immediate result is to keep the primary caregiver nearby; the long-term effect is to increase the infant’s chances of survival (Thompson, 2006, 2015).

Attachment does not emerge suddenly but rather develops in a series of phases, moving from a baby’s general preference for human figures to a partnership with primary caregivers. Following are four such

phases based on Bowlby’s conceptualization of attachment (Schaffer, 1996):

Phase 1: from birth to 2 months. Infants instinctively direct their attachment to human figures. Strangers, siblings, and parents are equally likely to elicit smiling or crying from the infant.

Phase 2: from 2 to 7 months. Attachment becomes focused on one figure, usually the primary caregiver, as the baby gradually learns to distinguish between familiar and unfamiliar people.

Phase 3: from 7 to 24 months. Specific attachments develop. With increased locomotor skills, babies actively seek contact with regular caregivers, such as the mother or father.

Phase 4: from 24 months on. Children become aware of other people’s feelings, goals, and plans and begin to take these into account in directing their own actions.

Bowlby argued that infants develop an internal working model of attachment, a simple mental model of the caregiver, their relationship to this person, and the self as deserving of nurturant care.

The infant’s internal working model of attachment with the caregiver influences the infant’s, and later the child’s, subsequent responses to other people

### Individual Differences in Attachment

Although attachment to a caregiver intensifies midway through the first year, isn’t it likely that the quality of a baby’s attachment varies?

Mary Ainsworth created the strange situation, an observational measure of infant attachment in which the infant experiences a series of introductions, separations, and reunions with the caregiver and an adult stranger in a prescribed order.

In using the strange situation, researchers hope that their observations will provide information about the infant’s motivation to be near the caregiver and the degree to which the caregiver's presence provides the infant with security and confidence

Based on how babies respond in the strange situation, they are described as being securely attached or insecurely attached (in one of three ways) to the caregiver:

Securely attached babies use the caregiver as a secure base from which to explore the environment.

When they are in the presence of their caregiver, securely attached infants explore the room and examine toys that have been placed in it.

When the caregiver departs, securely attached infants might protest mildly; when the caregiver returns, these infants re-establish positive interaction with them, perhaps by smiling or climbing onto their lap. Subsequently, they often resume playing with the toys in the room.
Insecure avoidant babies show insecurity by avoiding the caregiver.
In the strange situation, these babies engage in little interaction with the caregiver, are not distressed when they leave the room, usually do not re establish contact with them upon their return, and may even turn their back on them.
If contact is established, the infant usually leans away or looks away.
Insecure resistant babies often cling to the caregiver and then resist by fighting against the closeness, perhaps by kicking or pushing away.
In the strange situation, these babies often cling anxiously to the caregiver and don't explore the playroom.
When the caregiver leaves, they often cry loudly and then push away if they try to comfort the babies upon their return.
Insecure disorganized babies are disorganized and disoriented. In the strange situation, these babies might appear dazed, confused, and fearful.
To be classified as disorganized, babies must show strong patterns of avoidance and resistance or display certain specified behaviours, such as extreme fearfulness around the caregiver.
Ainsworth proposed that secure attachment in the first year of life provides an important foundation for psychological development later in life.
The securely attached infant moves freely away from the caregiver but keeps track of where they are through periodic glances.
The securely attached infant responds positively to being picked up by others and, when put back down, freely moves away to play.
An insecurely attached infant, by contrast, avoids the caregiver or is ambivalent toward them; fears strangers; and is upset by minor, everyday separations.
If early attachment to a caregiver is important, it should relate to a child's social behaviour later in development.
For some children, early attachments seem to foreshadow later functioning
Early secure attachment (assessed by the behaviour during the strange situation at 12 and 18 months) was linked with positive emotional health; high self-esteem; self-confidence; and socially

competent interaction with peers, teachers, camp counsellors, and romantic partners through adolescence.
Also, a meta-analysis found that secure attachment in infancy was linked to social competence with peers in childhood
Further, another study revealed that infant attachment insecurity and early childhood behavioural inhibition predicted adolescent social anxiety symptoms
The Van Ryzin and colleagues (2011) study reflects a developmental cascade model, which involves connections across domains over time that influence developmental pathways and outcomes developmental cascades can include connections between a wide range of biological, cognitive, and socioemotional processes (attachment, for example), and can also involve social contexts such as families, peers, schools, and culture.
Further, links can produce positive or negative outcomes at different points in development, such as infancy, early childhood, middle and late childhood, adolescence, and adulthood.
A meta-analysis of 127 research reports supports the views just described (Pinquart, Feubner, & Ahnert, 2013).
In this analysis, the following conclusions were reached:
(1) moderate stability of attachment security occurred from early infancy to adulthood;
(2) no significant stability occurred for time intervals of more than 15 years;
(3) attachment stability was greater when the time span was less than 2 years than when it was more than 5 years; and
(4) securely attached children at risk were less likely to maintain attachment security, while insecurely attached children at risk were likely to continue to be insecurely attached.
In addition to challenging whether secure attachment in infancy serves as a critical or sensitive period, some developmentalists argue that the secure attachment concept does not adequately consider certain biological factors in development, such as genes and temperament

**Caregiving Styles and Attachment**

Is the style of caregiving linked with the quality of the infant's attachment?
Securely attached babies have caregivers who are sensitive to their signals and are consistently available to respond to the infants' needs

These caregivers often let their babies take an active part in determining the onset and pacing of interactions in the first year of life.
A study of 130 mother-infant dyads when infants were 7 months to 2 years of age found that maternal sensitivity and autonomy support predicted secure attachment
How do the caregivers of insecurely attached babies interact with them
Caregivers of avoidant babies tend to be unavailable or rejecting.
They often don’t respond to their babies’ signals and have little physical contact with them.
When they do interact with their babies, they may behave angrily and irritably.
Caregivers of resistant babies tend to be inconsistent; sometimes they respond to their babies’ needs, and sometimes they don’t.
In general, they tend not to be very affectionate with their babies and show little synchrony when interacting with them.
Caregivers of disorganized babies often neglect or physically abuse them

# Social Contexts

Now that we have explored the infant’s emotional and personality development and attachment, let’s examine the social contexts in which these occur. We begin by studying a number of aspects of the family and then turn to a social context in which infants increasingly spend time: child care.

## The Family

The family can be thought of as a constellation of subsystems—a complex whole made up of interrelated, interacting parts—defined in terms of generation, gender, and role.
Each family member participates in several subsystems.
The father and child represent one subsystem, the mother and father another; the mother, father, and child yet another; and so on.
These subsystems have reciprocal influences on each other,

### The Transition to Parenthood

Whether people become parents through pregnancy, adoption, or step-parenting, they face disequilibrium and must adapt to it.

Parents want to develop a strong attachment with their infant, but they also want to maintain strong attachments to their spouse and friends, and possibly to continue their careers.
Parents ask themselves how this new being will change their lives.
A baby places new restrictions on partners; no longer will they be able to rush out to a movie at a moment's notice, and money may not be readily available for vacations and other luxuries.

## Reciprocal Socialization

for many years, socialization was viewed as a one-way process: children were considered to be the products of their parents' socialization techniques.
According to more recent research, however, parent-child interaction is reciprocal
Reciprocal socialization is socialization that is bidirectional.
That is, children socialize their parents just as parents socialize their children
The types of behaviours involved in reciprocal socialization in infancy are temporally connected, mutually contingent behaviours such as one partner imitating the sound of another or the mother responding with a vocalization to the baby's arm movements.
These reciprocal interchanges and mutual influence processes are sometimes referred to as transactional
An important form of reciprocal socialization is scaffolding, in which parents time interactions so that the infant experiences turn taking with the parents.
Scaffolding can be used to support children's efforts at any age, support that Erikson argued was essential during the autonomy versus shame and doubt stage and that is an essential component of Vygotsky's sociocultural cognitive theory.

## Maternal and Paternal Caregiving

Much of our discussion of attachment has focused on mothers as caregivers.
Do mothers and fathers differ in their caregiving roles? In general, mothers on average still spend considerably more time in caregiving with infants and children than do fathers

Maternal interactions usually centre on child- care activities—feeding, changing diapers, and bathing. Paternal interactions are more likely to include play, especially rough-and-tumble play
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## Parental Leave

Parents of infants and young children must balance the demands of paid employment versus caring for their children.
This challenge is especially acute during infancy.
Childcare policies around the world vary
Europe has led the way in creating new standards of parental leave: in 1992, the European Union (EU) mandated a paid 14-week maternity leave.
In most European countries today, working parents on leave receive 70 to 100 percent of the worker's prior wage, and paid leave averages about 16 weeks
The Nordic countries (Denmark, Norway, and Sweden) have extensive gender-equity family leave policies for childbirth that emphasize the contributions of both women and men.
For example, in Sweden, parents can take an 18-month, job-protected parental leave with benefits to be shared by both parents and applied to full-time or part-time work.
At the other end of the spectrum, the United States currently allows up to 12 weeks of unpaid leave for parents who are caring for a newborn and is the only wealthy country in the world that does not mandate paid leave for mothers of newborns
In Canada, both the federal and provincial/territorial govern- ments have parental leave policies.
Federal programs, such as Employment Insurance (EI), also help parents during their leave.
Effective March 2019, parents can take up to 15 weeks of maternity leave (restricted to the person giving birth), which can be followed by up to 40 weeks of parental leave or 69 weeks of extended parental leave, with the latter two differing only in the EI benefits (55 percent versus 33 percent)

It is noteworthy that one parent cannot receive more than 35 weeks of parental leave or 61 weeks of extended parental leave—a policy that encourages both parents to participate.
The number of fathers taking parental leave is still small, but increasing. In 2014, 27.1 percent of fathers across Canada claimed parental leave; that number increased to 30 percent in 2015.
This means that about 260 more infants spent significant time with their fathers in 2015 than in 2014.
However, there are dramatic regional differences .in the proportion of fathers claiming parental leave, and these reflect provincial differences in benefits.
The Quebec Parental Insurance Plan, which was introduced in 2006, has had a major impact on the number of fathers who have claimed or intend to claim parental benefits in Quebec.
It includes leave that applies exclusively to fathers.
Since the introduction of this program, the proportion of new fathers in Quebec who have claimed or intend to claim parental benefits increased by 58.0 percentage points, from 27.8 percent in 2005 to 85.8 percent in 2015. In other provinces, the number is much lower—just over 10 percent

## Child Care

Many Canadian children today experience multiple caregivers.
Rather than having a parent staying home to care for them, the children receive child care—that is, some type of care provided by others.
Over the last three decades, the need for child care in Canada has grown steadily. This increase has been driven largely by the rise of dual-income- earner families, a consequence of rising employment rates among women (Sinha, 2014).
The demand for quality child care has also increased because of the potential benefits for peer socialization, school readiness, and numeracy and language skills
Finding the most appropriate child-care arrangement can at times be extremely challenging.
Most parents need to balance overall quality with the convenience, availability, and cost of child care.
They need to decide between home daycares (which are most popular in Quebec), daycare centres (most popular in Ontario, Quebec, and the

Atlantic provinces), and private care (most popular in the Atlantic and prairie provinces)
High-quality child care also involves providing children with a safe environment, access to age-appropriate toys and participation in age-appropriate activities, and a low caregiver-child ratio that allows caregivers to spend considerable one-to-one time with children.
Attending a high-quality care program can serve as a powerful lifeline when a child’s home environment is poor
Unfortunately, children are more likely to experience poor-quality child care if they come from families with relatively few resources
The parent Quality Information Project is a Canadian undertaking intended to provide resources for Canadian parents to help them understand and access high-quality care to meet not only their children’s needs but their own needs as well.
Most provinces are moving to initiate education programs that link early childhood development with the schooling that begins at age 4. Ontario initiated an extensive pilot project in full-day kindergarten (for 4- and S-year-olds) in 2011, and full implementation across the province was achieved in 2016. While these initiatives may cost taxpayers more money, Daniel Trefler (2009) suggests that the benefits arising from a bettereducated and healthier population will offset the initial investment in a “high-quality, universal early child development program”