



ESSENTIALS OF LIFE-SPAN DEVELOPMENT JOHN W. SANTROCK

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PHYSICAL AND COGNITIVE DEVELOPMENT IN
INFANCY

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CHAPTER OUTLINE

- Physical growth and development in infancy
- Motor development
- Sensory and perceptual development
- Cognitive development
- Language development

PHYSICAL GROWTH AND DEVELOPMENT IN INFANCY

- Patterns of growth
- Height and weight
- The brain
- Sleep
- Nutrition

PATTERNS OF GROWTH

- **Cephalocaudal pattern:** Sequence in which the earliest growth always occurs at the top
 - Physical growth and differentiation of features work their way down from top to bottom
- **Proximodistal pattern:** Sequence in which growth starts at the center of the body and moves toward the extremities

HEIGHT AND WEIGHT

- The average American newborn is 20 inches long and weighs 7 pounds
- Most of the newborns are 18 to 22 inches long and weigh between 5 and 10 pounds
- Grow about 1 inch per month during the first year
- By 2 years of age
 - Infants weigh approximately 26 to 32 pounds
 - Average 32 to 35 inches in height

THE BRAIN

- Contains tens of billions of nerve cells at birth
- Shaken baby syndrome - Brain swelling and hemorrhaging

THE BRAIN

- Brain's development
 - Mapping the brain
 - Brain has two halves
 - **Lateralization:** Specialization of function in one hemisphere of the cerebral cortex or the other

FIGURE 3.2 - THE BRAIN'S FOUR LOBES

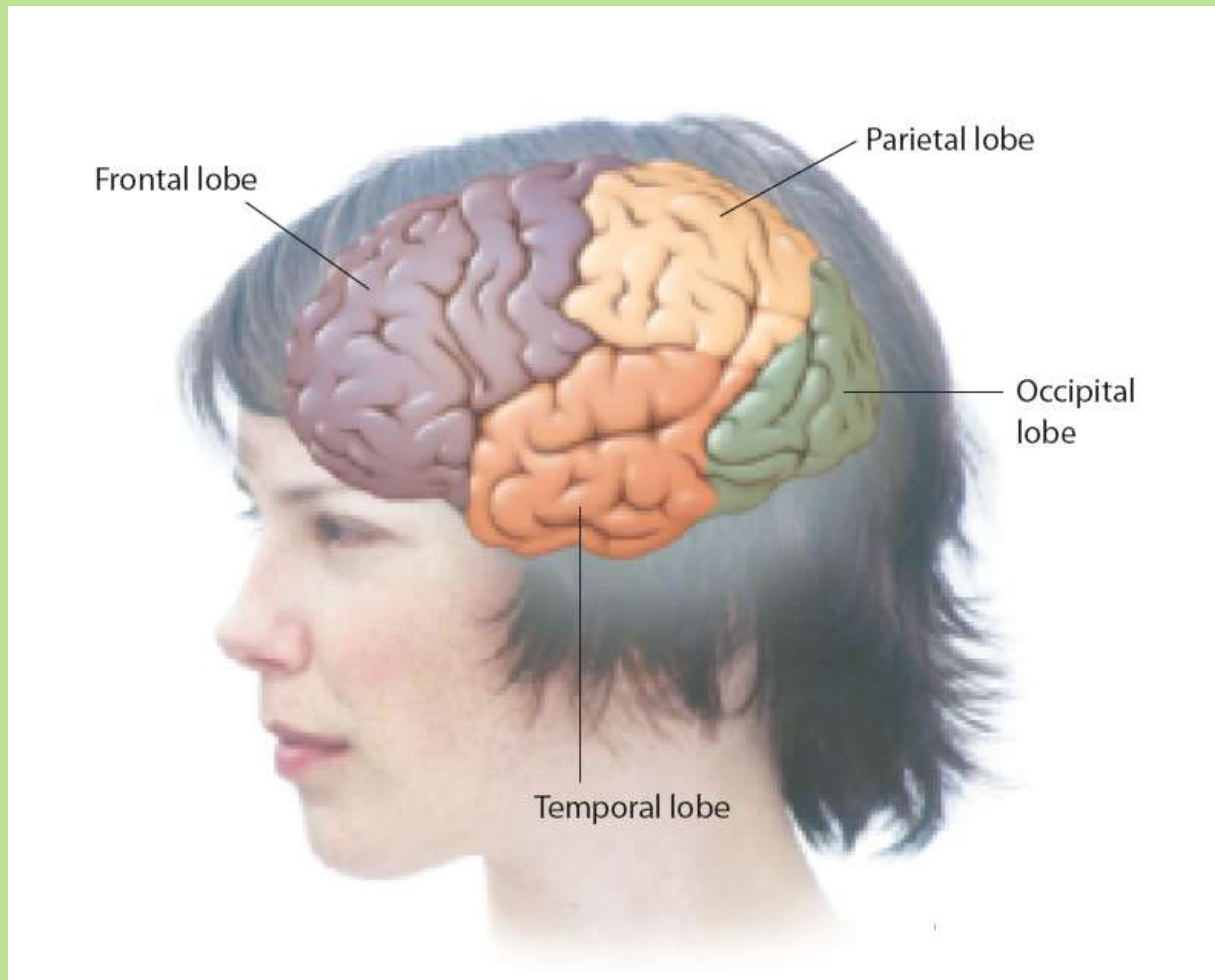
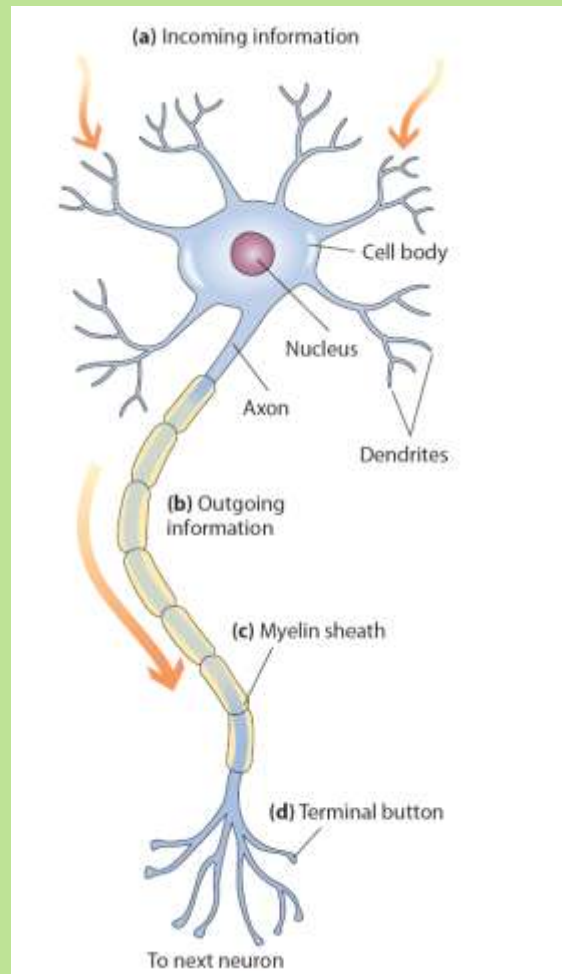


FIGURE 3.3 - THE NEURON



THE BRAIN

- Changes in neurons
 - Myelination
 - Connectivity among neurons increases
- Changes in regions of the brain
 - Blooming and pruning vary by brain region
 - Peak of synaptic overproduction in the visual cortex followed by a gradual retraction
 - Heredity and environment influence the timing and course
 - Pace of myelination varies

FIGURE 3.4 - DENDRITIC SPREADING

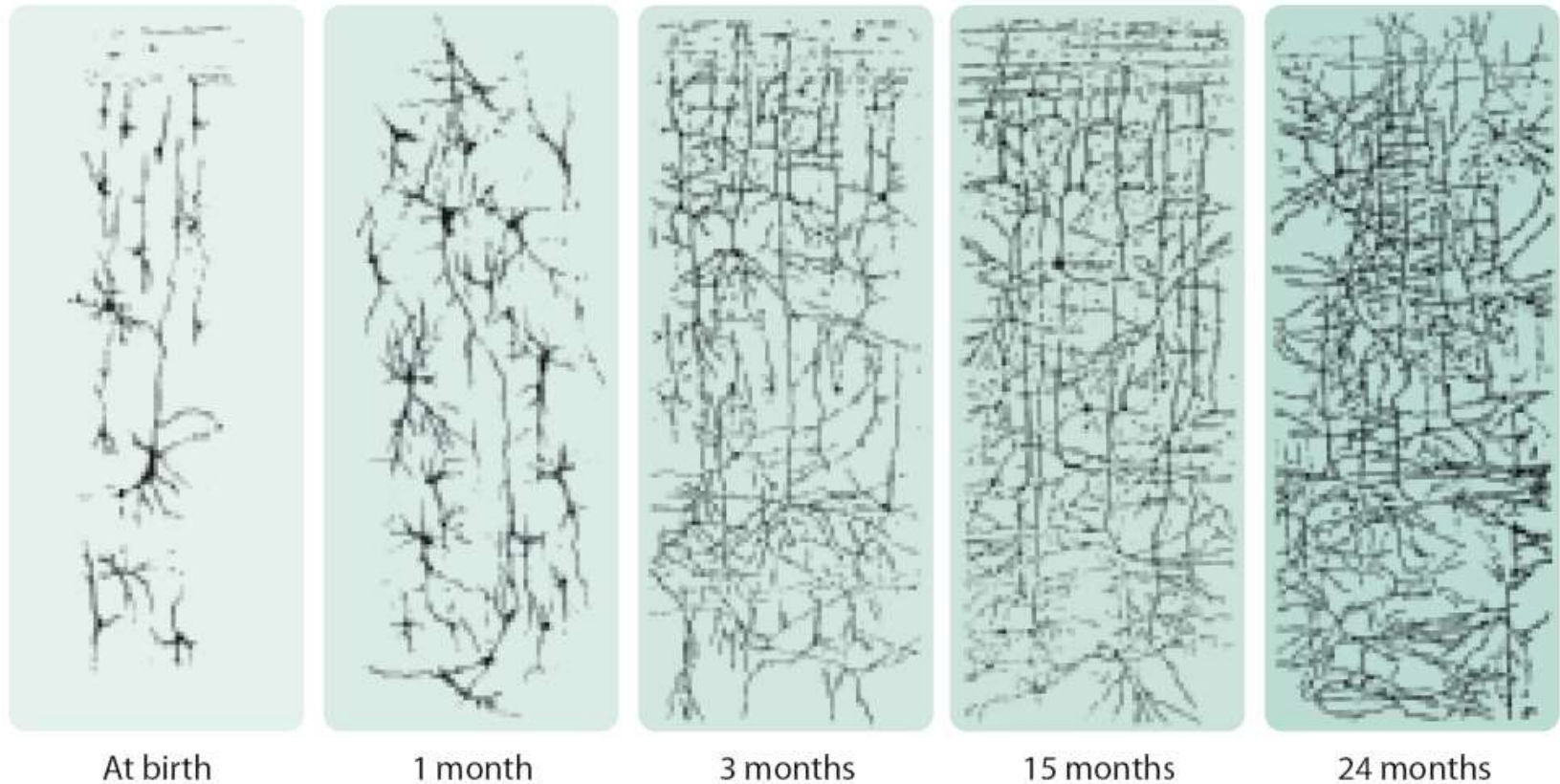
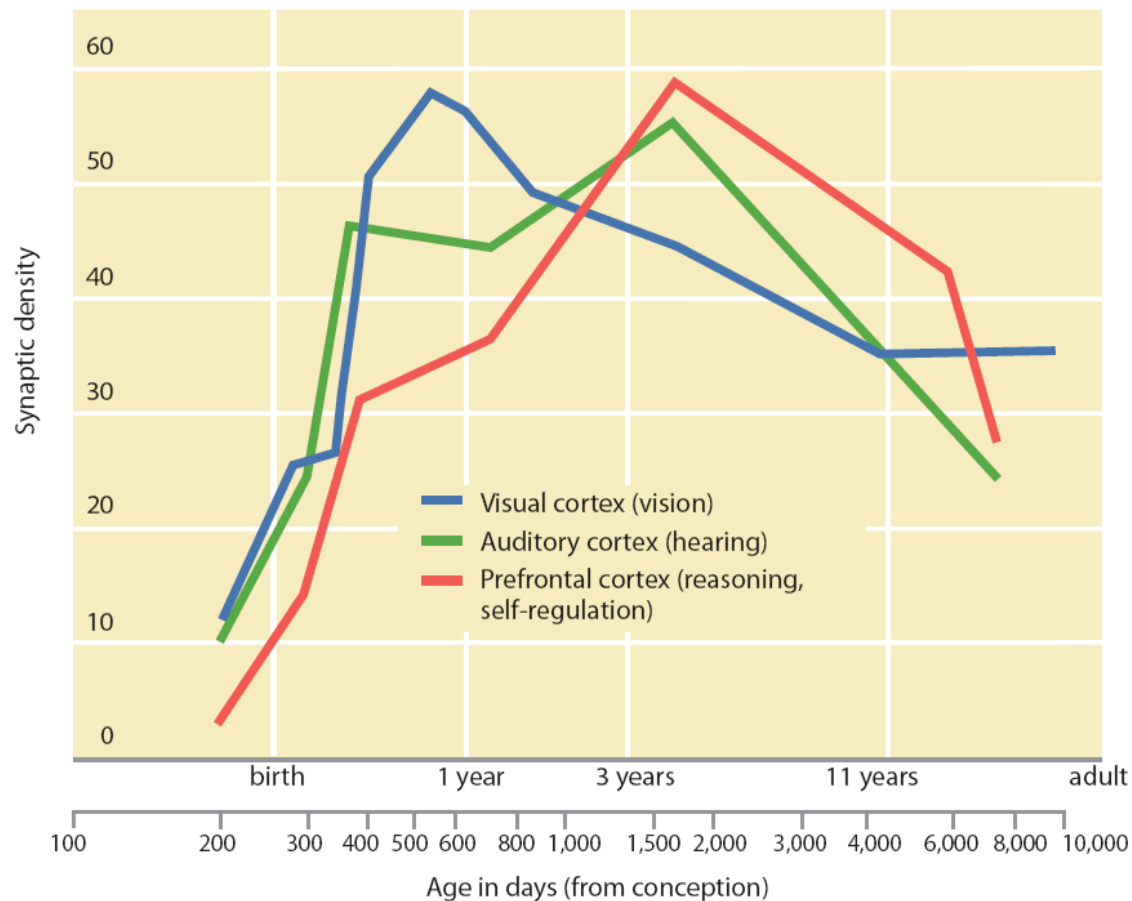


FIGURE 3.5 - SYNAPTIC DENSITY IN THE HUMAN BRAIN FROM INFANCY TO ADULTHOOD



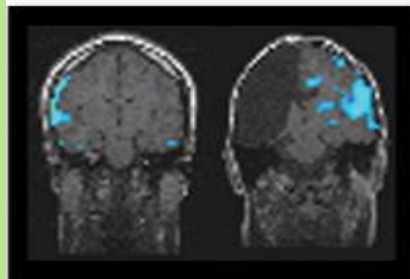
THE BRAIN

- Early experience and the brain
 - Children in deprived environment may have depressed brain activity
 - Brain demonstrates both flexibility and resilience

FIGURE 3.6 - PLASTICITY IN THE BRAIN'S HEMISPHERES



(a)



(b)

THE BRAIN

- **Neuroconstructivist view:**
 - Biological processes and environmental conditions influence the brain's development
 - Brain has plasticity and is context dependent
 - Development of the brain and the child's cognitive development are closely linked

SLEEP

- Typical newborn sleeps 16 to 17 hours a day
- Infant sleep-related problem - Night-time waking
- REM sleep - Rapid eye movement sleep
 - Infants spend about half of their sleep time in REM sleep
 - Often begin sleep cycle with REM sleep rather than non-REM sleep

SLEEP

- **Sudden infant death syndrome (SIDS):** Occurs when an infant stops breathing, usually at night
 - Suddenly dies without an apparent cause

SIDS - FINDINGS

- Occurs mostly in infants with abnormal brain stem functioning involving serotonin
- More likely to occur:
 - In low birth weight infants
 - In African American and Eskimo infants
 - In infants passively exposed to cigarette smoke
 - When infants and parents share the same bed
 - When infants use a pacifier when they go to sleep
 - When infants sleep in a bedroom with a fan

NUTRITION

- Breast versus bottle-feeding
 - Breast feeding is better
- Benefits of breast feeding - Outcomes for the child
 - Appropriate weight gain
 - Lowered risk of childhood obesity
 - Fewer gastrointestinal infections
 - Fewer lower respiratory tract infections

NUTRITION

- Benefits of breast feeding - Outcomes for the mother
 - Lower incidence of breast cancer
 - Reduction in ovarian cancer
- Mother should not breast feed if:
 - Infected with HIV or some other infectious disease
 - She has active tuberculosis
 - She is taking any drug that is not safe for the infant

NUTRITION

- Nutritional needs
 - Are individual among infants
 - Adequate early nutrition is an important aspect of healthy development

MOTOR DEVELOPMENT

- The Dynamic Systems view
- Reflexes
- Gross motor skills
- Fine motor skills

DYNAMIC SYSTEMS THEORY

- Infants assemble motor skills for perceiving and acting
 - Perception and action are coupled together
- Motor skill is developed by:
 - Development of the nervous system
 - Body's physical properties and its possibilities for movement
 - Goal the child is motivated to reach
 - Environmental support for the skill

REFLEXES

- Built-in reactions to stimuli
 - Govern the newborn's movements
 - Genetically carried survival mechanisms that are automatic and involuntary
- Rooting reflex - Occurs when the infant's cheek is stroked or the side of the mouth is touched
 - Turns his or her head in an effort to find something to suck

REFLEXES

- Sucking reflex - Occurs when newborns automatically suck an object placed in their mouth
 - Enables newborns to get nourishment before they have associated a nipple with food

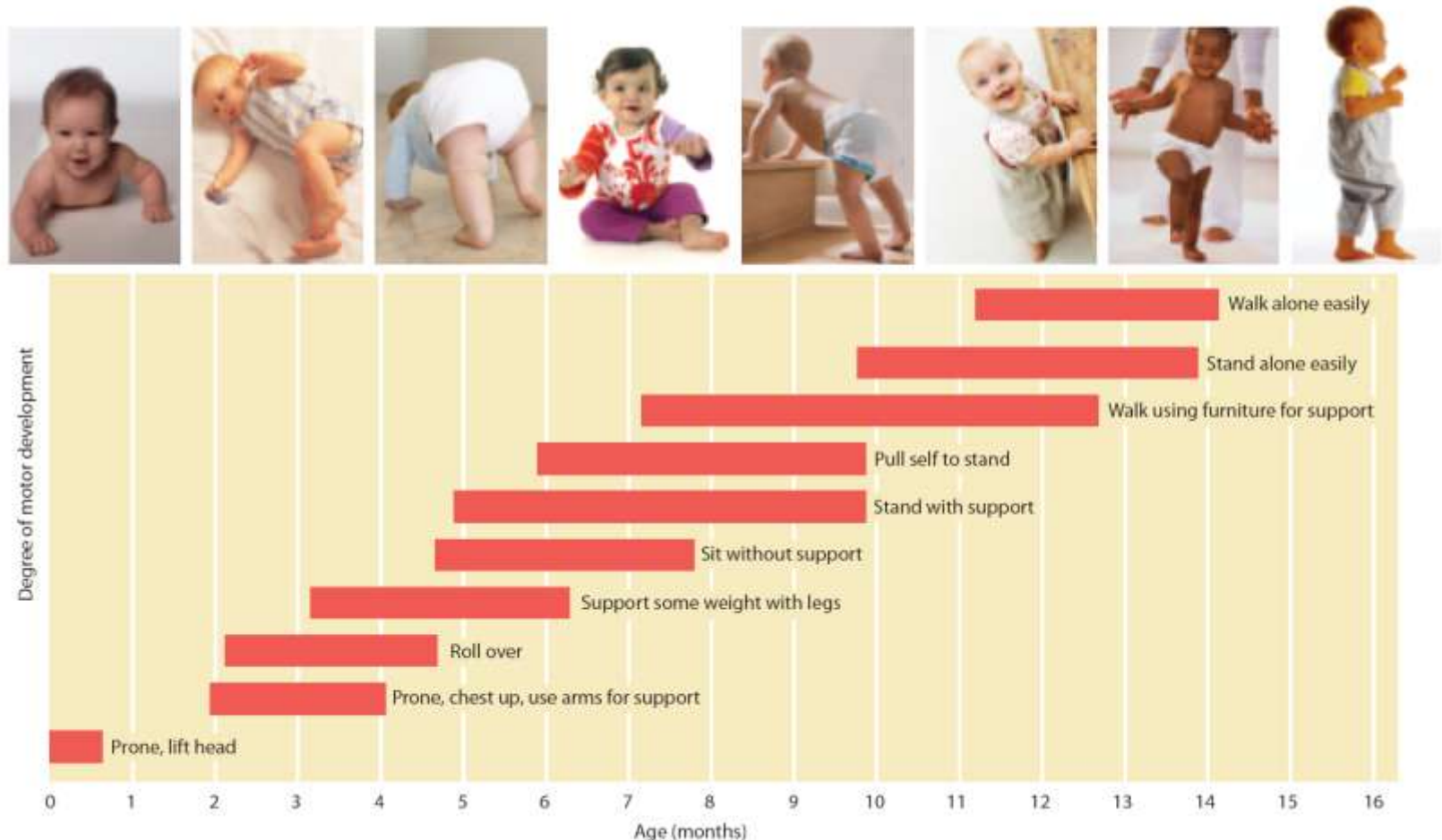
REFLEXES

- Moro reflex - Occurs in reaction to a sudden, intense noise or movement
 - Believed to be a way of grabbing for support while falling
- Grasping reflex - Occurs when something touches the infant's palms
 - Responds by grasping tightly

GROSS MOTOR SKILLS

- Involve large-muscle activities
 - Such as moving one's arms and walking
- Newborn infants cannot voluntarily control their posture
 - Locomotion and postural control are closely linked, especially in walking upright

FIGURE 3.9 - MILESTONES IN GROSS MOTOR DEVELOPMENT



GROSS MOTOR SKILLS

- Development in the second year
 - Toddlers become more mobile as motor skills are honed
 - By 13-18 months
 - Toddlers can pull a toy or climb stairs
 - By 18-24 months
 - Toddlers can walk quickly
 - Balance on their feet
 - Walk backward and stand and kick a ball

FINE MOTOR SKILLS

- Involve more finely tuned movements
 - Grasping a toy, using a spoon, buttoning a shirt, or anything that requires finger dexterity
- Infants need to exercise their fine motor skills
 - Pincer grip

SENSORY AND PERCEPTUAL DEVELOPMENT

- Exploring sensory and perceptual development
- Visual perception
- Other senses
- Intermodal perception
- Nature, nurture, and perceptual development
- Perceptual motor coupling

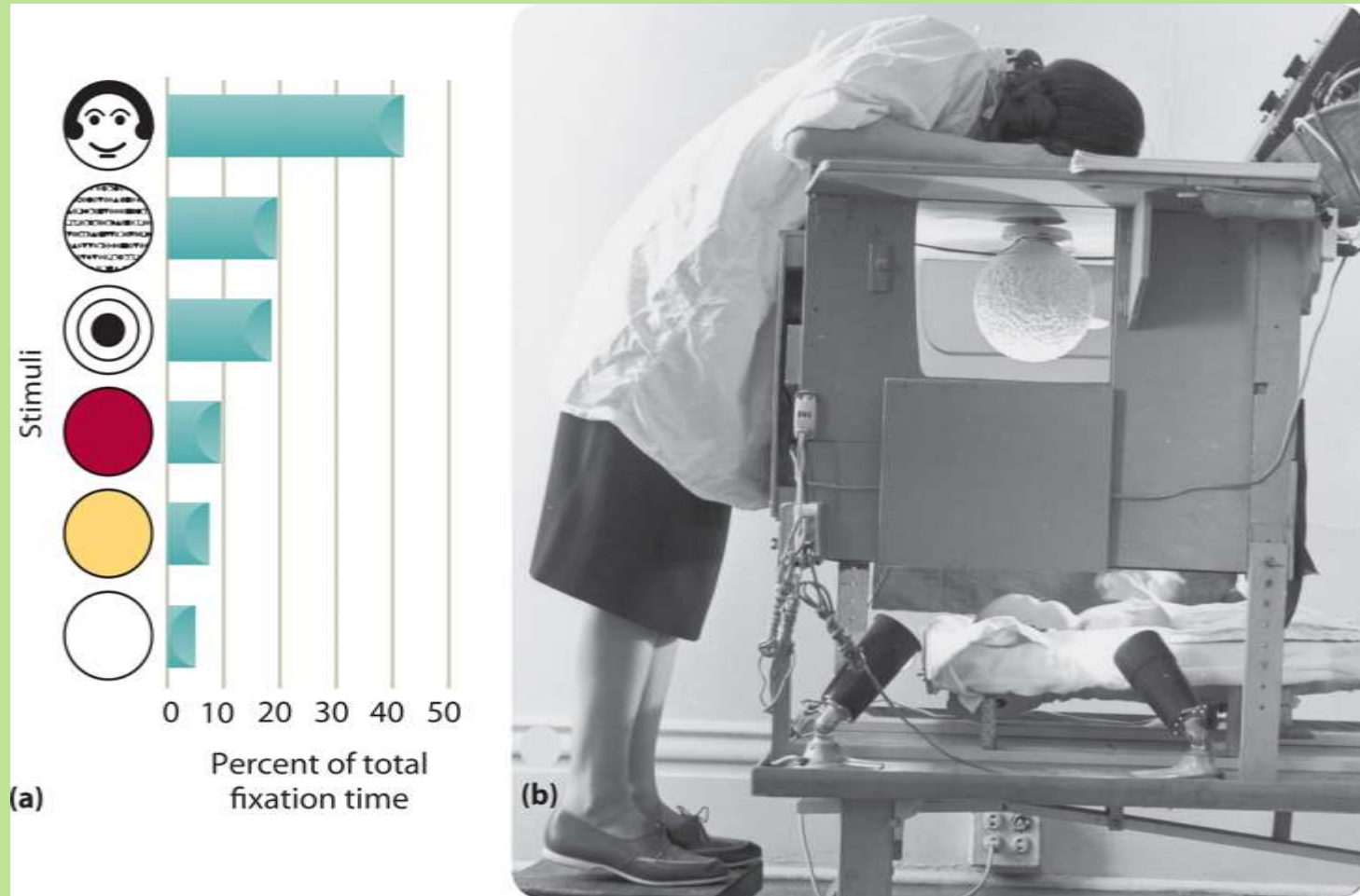
EXPLORING SENSORY AND PERCEPTUAL DEVELOPMENT

- **Sensation:** Occurs when information interacts with sensory receptors
 - Eyes, ears, tongue, nostrils, and skin
- **Perception:** Interpretation of what is sensed

EXPLORING SENSORY AND PERCEPTUAL DEVELOPMENT

- **Ecological view**
 - Directly perceives information that exists in the world around us
- Studying the infant's perception
 - **Visual preference method:** Studying whether infants can distinguish one stimulus from another by measuring the length of time they attend to different stimuli

FIGURE 3.11 - FANTZ'S EXPERIMENT ON INFANTS' VISUAL PERCEPTION



EXPLORING SENSORY AND PERCEPTUAL DEVELOPMENT

- Habituation and dishabituation
 - **Habituation:** Name given to decreased responsiveness to a stimulus after repeated presentations of the stimulus
 - **Dishabituation:** Recovery of a habituated response after a change in stimulation
- Equipment
 - Technology can facilitate the use of most methods for investigating the infant's perceptual abilities

FIGURE 3.13 - VISUAL ACUITY DURING THE FIRST MONTHS OF LIFE



VISUAL PERCEPTION

- Perceptual patterns
 - Even 2- to 3-week-old infants prefer to look at patterned displays rather than at nonpatterned displays
- Perceiving occluded objects
- Depth perception

FIGURE 3.14 - INFANTS' PREDICTIVE TRACKING OF A BRIEFLY OCCLUDED MOVING BALL

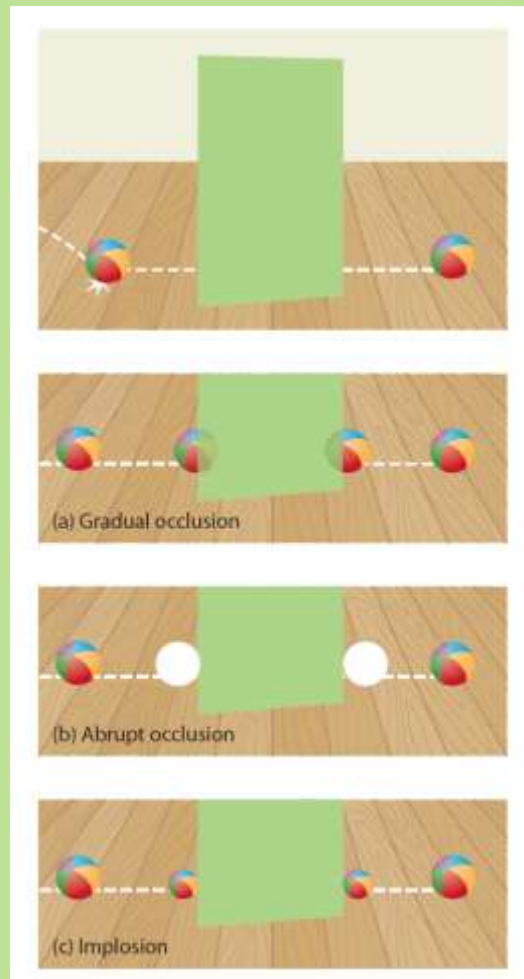


FIGURE 3.15 - EXAMINING INFANTS' DEPTH PERCEPTION ON THE VISUAL CLIFF



OTHER SENSES

- Hearing
 - Changes in hearing
 - LoudnessOther Senses
 - Pitch
 - Localization
- Touch and pain
- Smell
- Taste

INTERMODAL PERCEPTION

- Involves integrating information from two or more sensory modalities
 - Vision and hearing
 - Most perception is intermodal

NATURE, NURTURE, AND PERCEPTUAL DEVELOPMENT

- Nativists - Emphasize nature
- Empiricists - Emphasize learning and experience

PERCEPTUAL MOTOR COUPLING

- Perception and action are not isolated but rather are coupled
- Individuals perceive in order to move and move in order to perceive

COGNITIVE DEVELOPMENT

- Piaget's theory
- Learning, remembering, and conceptualizing

PIAGET'S THEORY

- Processes of development
 - **Schemes:** Actions or mental representations that organize knowledge
 - Behavioral scheme
 - Mental scheme
 - **Assimilation:** Using existing schemes to deal with new information or experiences
 - **Accommodation:** Adjusting schemes to fit new information and experiences

PIAGET'S THEORY

- **Organization:** Grouping of isolated behaviors and thoughts into a higher-order system
- Equilibration and stages of development
 - **Equilibration:** Mechanism by which children shift from one stage of thought to the next
 - Individuals go through four stages of development
 - Cognition is qualitatively different from one stage to another
- **Sensorimotor stage:** Lasts from birth to about age 2
- **Object permanence:** Understanding that objects and events continue to exist:
 - When they cannot directly be seen, heard, or touched

FIGURE 3.17 - OBJECT PERMANENCE



EVALUATING PIAGET'S SENSORIMOTOR STAGE

- **A-not-B error:** Tendency of infants to reach where an object was located earlier rather than where the object was last hidden
 - Older infants are less likely to make the A-not-B error because their concept of object permanence is more complete
- **Core knowledge approach:** States that infants are born with domain-specific innate knowledge systems

LEARNING, REMEMBERING, AND CONCEPTUALIZING

- Operant conditioning
 - If an infant's behavior is followed by a rewarding stimulus, the behavior is likely to recur
- **Attention:**
 - Focusing of mental resources on select information
 - Habituation and dishabituation closely linked
 - **Joint attention:** Requires
 - Ability to track another's behavior
 - One person's directing another's attention

LEARNING, REMEMBERING, AND CONCEPTUALIZING

- Reciprocal interaction
 - Imitation
 - Involves flexibility and adaptability
 - **Deferred imitation:** Occurs after a delay of hours or days

LEARNING, REMEMBERING, AND CONCEPTUALIZING

- **Memory**

- Involves retention of information over time
 - **Implicit memory:** Without conscious recollection
 - **Explicit memory:** Conscious remembering of facts and experiences
- Childhood amnesia - Most adults can remember little, if anything, from the first 3 years of their life

LEARNING, REMEMBERING, AND CONCEPTUALIZING

- Concept formation and categorization
 - **Concepts:** Cognitive groupings of similar objects, events, people, or ideas
 - Perceptual categorization
 - Conceptual categorization

LANGUAGE DEVELOPMENT

- Defining language
- How language develops
- Biological and environmental influences

DEFINING LANGUAGE

- **Language:** Form of communication
 - Spoken, written, or signed
 - Based on a system of symbols
 - Consists of the words used by a community and the rules for varying and combining them
- Infinite generativity - Ability to produce an endless number of meaningful sentences using:
 - Finite set of words and rules

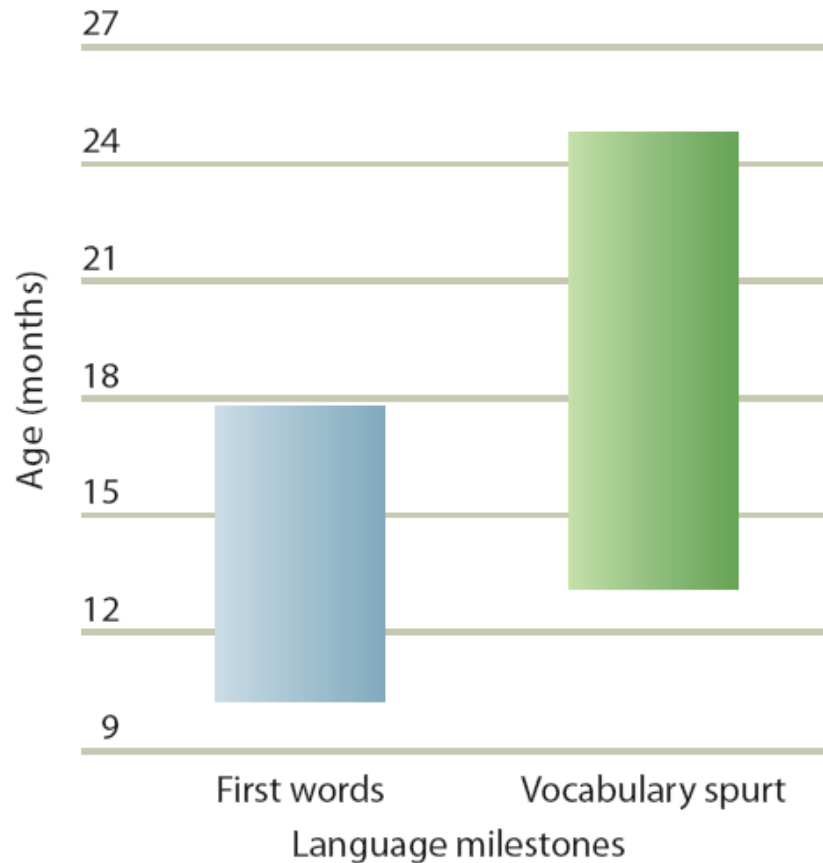
HOW LANGUAGE DEVELOPS

- Babbling and gestures
 - Crying
 - Cooing
 - Babbling
 - Showing and pointing
- Recognizing language sounds

HOW LANGUAGE DEVELOPS

- First words
 - Infancy receptive vocabulary considerably exceeds spoken vocabulary
 - Receptive vocabulary - Words the child understands
 - Spoken vocabulary - Words the child uses
 - Vocabulary spurt

FIGURE 3.23 - VARIATION IN LANGUAGE MILESTONES



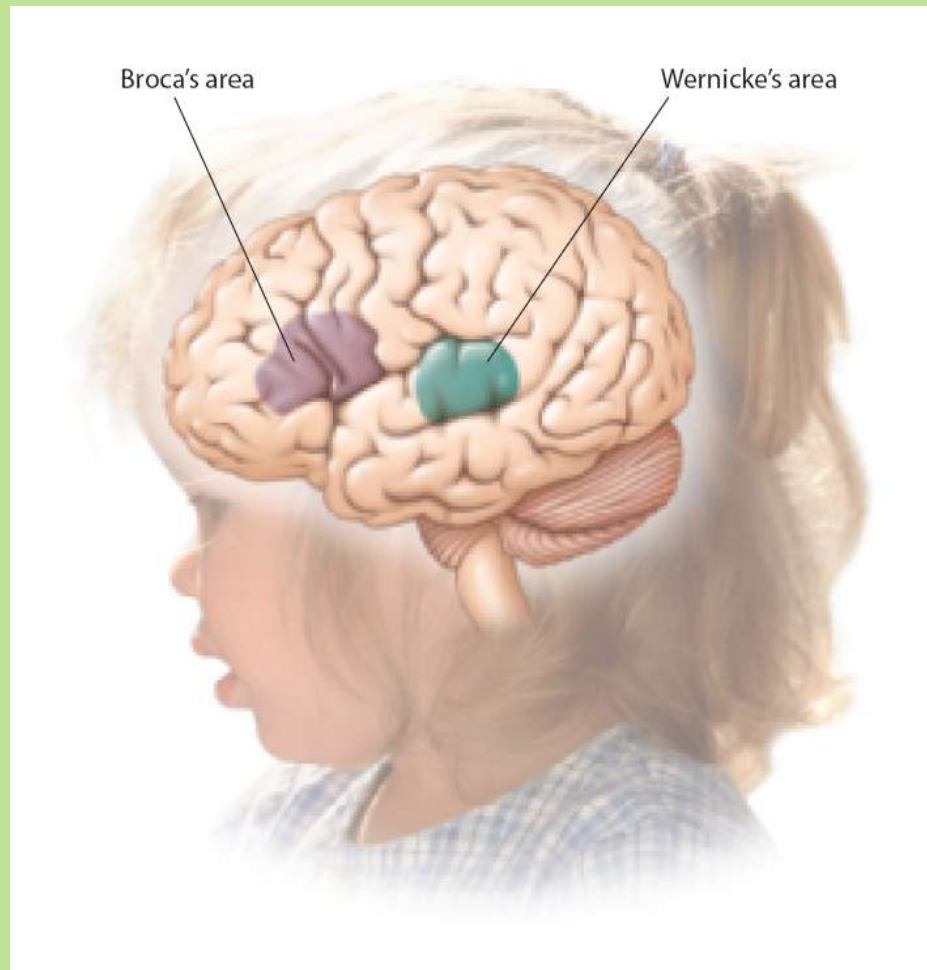
HOW LANGUAGE DEVELOPS

- Two-word utterances
 - To convey meaning child relies on:
 - Gesture, tone, and context
 - Telegraphic speech: Use of short and precise words without grammatical markers:
 - Articles, auxiliary verbs, and other connectives

BIOLOGICAL INFLUENCES

- Regions involved in language
 - Broca's area - In the brain's left frontal lobe that is involved in speech production
 - Wernicke's area - In the brain's left hemisphere that is involved in language comprehension

FIGURE 3.25 - BROCA'S AREA AND WERNICKE'S AREA



BIOLOGICAL INFLUENCES

- **Language acquisition device (LAD):** Chomsky's term that describes a biological endowment enabling the child to:
 - Detect the features and rules of language, including phonology, syntax, and semantics

ENVIRONMENTAL INFLUENCES

- Behaviorist view of language learning has several problems
 - Does not explain how people create novel sentences
 - Children learn the syntax of their native language even if they are not reinforced for doing so

ENVIRONMENTAL INFLUENCES

- Vocabulary development is linked to:
 - Family's socioeconomic status
 - Type of talk that parents direct to their children
- **Child-directed speech:** Language spoken in a higher pitch than normal, using simple words and sentences

ENVIRONMENTAL INFLUENCES

- Three strategies to enhance child's acquisition of language:
 - Recasting
 - Expanding
 - Labeling

INTERACTIONIST VIEW

- Biology and experience contribute to language development